

Epistemological stretching and  
transformative sustainability learning: An intuitive inquiry

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By

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## **ABSTRACT**

I have chosen to conduct an intuitive inquiry into the relationship between a pedagogical focus on epistemological stretching and transformative sustainability learning. The study contributes to theoretical and practical knowledge of teaching and learning about and within the realm of transformative sustainability learning, and contributes to a deepened understanding of epistemological stretching as a pedagogical orientation. Specifically, I have investigated the implications of epistemological stretching as a focal point for teaching and learning for students in ENV5 811: Multiple Ways of Knowing in Environmental Decision Making, a graduate level course in the School of Environment and Sustainability (SENS) at the University of Saskatchewan.

Using the 5 cycles of Intuitive Inquiry, this research records and interprets accounts of eight students who participated in ENV5 811. The course is oriented around critical examination of human-nature relations with an emphasis on epistemology. The goal for this research is to investigate the ways in which a focus on epistemological stretching can enable three things: (1) prepare students to engage in interdisciplinary and sustainability knowledge creation; (2) help alleviate the epistemic incongruence in resource co-management arrangements; and (3) bring multiple ways of knowing to bear on complex environmental issues.

This research is focused on answering three questions:

1. In what ways can a focus on epistemology help enable perspective transformation implicit in a transformative learning experience?
2. In what ways can educating for epistemological stretching result in new ways of thinking, valuing, doing?

3. In what ways can epistemological stretching help students engage in more effective and ethically appropriate ways with Indigenous peoples and their knowledges?

This research concludes that epistemological stretching can contribute to transformative sustainability pedagogy in meaningful ways and develops 5 lenses for describing the conceptual spaces in which learning occurs: acknowledgement and deconstruction of power, relationship reconceptualization, change in perspective and action, worldview bridging, and validation of previously held views.

*Keywords: Epistemological stretching, transformative sustainability learning, environmental education, resource co-management, ethical Indigenous engagement.*

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***Figure 1:*** Threshold concepts chart assessing concepts that helped students engage with epistemological pluralism.

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## **CHAPTER 1: INTRODUCTION**

### **Research Objectives**

The study contributes to theoretical and practical knowledge of teaching and learning about and within the realm of transformative sustainability learning, and contributes to a deepened understanding of epistemological stretching as a pedagogical orientation. By taking a closer look at the experience of epistemological stretching we find that it offers us a way to educate for more ethical and effective engagement with Indigenous knowledge holders. This research also contributes to understanding how a focus on epistemological stretching can make new possibilities and sustainability trajectories available to students, offer insight into how a focus on epistemology can move students towards a deeper understanding of social and ecological justice, and tell the story of how incorporating multiple ways of knowing into the curriculum can enhance field work, research, and engagement with sustainability and Indigenous knowledges, as the students progress after course completion.

The goal for this research is to be part of a process that positions sustainability education to enable three things: (1) prepare students to engage in interdisciplinary and sustainability knowledge creation, (2) help alleviate the epistemic incongruence in resource co-management arrangements, and (3) bring multiple ways of knowing to bear on complex environmental issues.

### **Research Questions**

This research investigates the relationship between epistemological stretching and transformative sustainability learning, specifically seeking to answer the following questions:

1. In what ways can a focus on epistemology help enable perspective transformation implicit in a transformative learning experience?
2. In what ways can educating for epistemological stretching result in new ways of thinking, valuing, doing?
3. In what ways can epistemological stretching help students engage in more effective and ethically appropriate ways with Indigenous peoples and their knowledges?

### **Epistemological Stretching**

A focus on epistemological stretching can have great value in educating for sustainability. First, an epistemologically plural and reflexive approach is necessary for the production of sustainability knowledge, and engagement with interdisciplinarity (Healy, 2003; Frodeman, 2011; Miller, Baird, Littlefield, Kofinas, Chapin III, Redman, 2008; Miller, Muñoz-Erickson, Redman, 2011; Murphy, 2011). Second, many of the issues hampering effective and ethical engagement with Indigenous knowledge holders in resource co-management regimes revolve around epistemology and ontology. Discrete pieces of Indigenous knowledge are seen as valuable by western scientists but the ways of knowing and cosmological orientation from which the knowledge originates is often not acknowledged (Blaser, 2013; Bohensky & Maru, 2011; Castillo, 2009; Houde, 2007; McGregor, 2008; Nadasdy, 1999; Nadasdy, 2007; Wilkinson, Clark, Burch, 2007). Third, conventional reductionist approaches are not proving themselves adequate

for addressing wicked environmental problems emerging from complex socio-ecological systems (Barrett, 2013; IPBES, 2011; Miller et. al, 2011; Shiva, 2000; Wilkinson et. al, 2007).

Teaching and learning towards epistemological stretching is positioned to help address the three aforementioned issues, and thus would be valuable as a key focus of educating for sustainability. Sterling (2010) interprets a “ learning level, which may be said to be epistemic learning; that is, it involves a shift of epistemology or operative way of knowing and thinking that frames people’s perception of, and interaction with, the world” (p. 23). This model of epistemic learning originates with Gregory Bateson (1972), who laments the lack of a word in our language which combines the meanings given to epistemology and ontology due to how entangled and mutually informing the two concepts are. His view is that both of these terms constitute aspects of a matrix “of habitual assumptions or premises implicit in the relationship between man and environment”, uses the single term epistemology to cover both aspects, and views the importance of epistemology as its influence over the *relationship* (emphasis mine) between humans, knowledge, and their environment (p. 314). Sterling (2010) describes the result of epistemic learning as “seeing our worldview rather than seeing with our worldview so that we can be more open to and draw upon other views and possibilities” (p. 23). For the purposes of this research epistemological stretching will be defined as “the expansion of the ways of knowing that someone respects, understands, and/or engages with” (Barrett, Harmin, Maracle, Thomson, 2014). By this definition, epistemological stretching is an expansion of ways in which one is willing and able to relate to their environment.

## **Transformative Sustainability Learning**

Transformative sustainability learning theory originates with case studies conducted at the University of British Columbia Centre for Sustainable Food Systems (see Sipos, Battisti, Grimm, 2008). It is presented with the pedagogical model of head, hands and heart, which is “shorthand for engaging cognitive, psychomotor, and affective learning domains” (Sipos, Battisti, Grimm, 2008, p. 72). Epistemological stretching is the organizing principle in the course this research is based on, and both pedagogical models work towards “learning that facilitates personal experience for participants resulting in profound changes in knowledge, skills and attitudes related to enhancing ecological, social and economic justice” (Sipos, Battisti, Grimm, 2008, p. 74). Epistemological stretching was developed in a course that served many students whose work and research would benefit from preparation to more ably engage with Indigenous and local knowledge holders. While epistemological stretching is a different pedagogical orientation, there are parallels in the practical application of both (which will be discussed in Cycle 5), and some of the differences may be attributed to aspects of the courses which make both techniques more contextually specific and applicable.

In the context of the University of Saskatchewan School of Environment and Sustainability, transformative sustainability learning is intended to create the learning experiences necessary for learners to engage in interdisciplinary sustainability knowledge creation, develop more elegant solutions to complex environmental problems, and interact in effective, socially just, and ethically appropriate ways with Indigenous knowledge holders. Transformative sustainability learning also gives the learner a glimpse of the importance of interdisciplinary knowledge creation, and a paradigmatic shift in perspective in order to create

space for sustainable ways of relating to nature and being human in a living world. The literature review below lays out three major threads in transformative sustainability learning: 1. transformative learning; 2. Interdisciplinary knowledge creation; and 3. implications and issues related to resource co-management.

## **CHAPTER 2: LITERATURE REVIEW**

### **Transformative Learning**

Scholars have noted a strong connection between sustainability education and transformative learning (e.g., Thomas, 2009; Burns, 2011; Sterling, 2010; Sipos, Battisti, Grimm, 2008). Transformative learning causes development in the frame of reference of the learner where “the most significant learning involves critical premise reflection of premises about oneself” (Mezirow, 1994, p. 224). This is an appropriate framework to apply to epistemic learning because learning within a paradigm does not alter the paradigm of the learner (Sterling, 2010). “We do not make transformative changes in the way we learn as long as what we learn fits comfortably into our existing frames of reference” (Mezirow, 1997, p. 7). Creating space for a paradigm to be examined, and potentially reconstructed, is inherently transformative (Sterling, 2010) and epistemological stretching asks students to expand their frame of reference.

Sustainability educators must work towards transforming the inhibiting processes and structures of knowledge generation and validation in order for the field of sustainability to rest on a socially robust and resilient epistemological foundation. As such, transformative learning is uniquely situated as an educational theory that can both describe and enable (pedagogically) the paradigmatic shift sustainability requires. “Transformation in meaning perspective is precipitated by life’s dilemmas which cannot be resolved by simply acquiring more information, enhancing problem solving skills, or adding to one’s competencies” (Mezirow, 1978, p.108). Sustainability presents an array of what Mezirow terms “disorienting dilemmas” (Mezirow, 1995) about the relationships of individuals and societies to nature, each other, and the frames of reference

enacted to make sense of these relationships. While some scholars emphasize critical reflection on epistemic frameworks as the source of transformative learning (Mezirow, 1978) other scholars emphasize a more intuitive relating through imaginal dialogue to unconscious influences on the structure of thought, though it is acknowledged that critical reflection and intuitive reimagining both play an important role in transformative learning (Dirkx et al, 2006). The learning examined in this research is a process, not a product, and was facilitated by a teaching style that incorporated both critical reflection and intuitive relating.

### **Interdisciplinary Knowledge Creation for Sustainability**

This research addresses a need in the context of interdisciplinary knowledge creation for sustainability by asking those involved in a sustainability graduate program to critically examine their epistemological assumptions, as well as the epistemology of sustainability as an interdisciplinary academic field. Academic institutions, in order to produce “sustainability knowledge” and address the complexity of sustainability problems in the context of social-ecological systems, are tasked with moving “beyond a rigid knowledge structure that may fail to raise the most relevant questions and provide the most integrative solutions” (Miller et al., 2008, p.4). Two key principles for sustainability knowledge creation in interdisciplinary research are: epistemological pluralism, and reflexivity (Miller et al., 2011). Epistemological pluralism is “the recognition and combination of multiple ways of knowing... and involves promoting the use of all relevant knowledge, perspectives, and viewpoints in a structured, rigorous manner” (Miller et al., 2008, p.2). Reflexivity in this context is defined as an “understanding that the institution itself is part of the dynamics of the system that it seeks to change” (Miller et al., 2011, p.3) and a willingness to reflect on its role within the social-ecological systems of which it is a part. By



engaging with epistemological pluralism, and reflecting on their own relationship to knowledge, students will have engaged in an exercise in reflexivity as it relates to their own knowledge practices, and those present in the field of sustainability. This self-reflection occurs while building their capacity to participate in sustainability oriented processes where “all relevant knowledge, perspectives and viewpoints are employed” (Healy, 2003, p.12).

### **Epistemic Incongruence in Resource Co-management**

This study is situated within a larger action research project entitled “*Encounters with the Living World: Indigenous Knowledges and Natural Resource Management*” (Barrett, Clark, Maracle, Musqua, 2011). The purpose of the larger action research project is to facilitate the inclusion of Indigenous knowledges in resource co-management processes in more effective and ethically appropriate ways by introducing students to multiple ways of knowing in environmental decision making. Although there is much to be celebrated in co-management processes, the incompatibility between western and Indigenous knowledges remains problematic (Houde, 2007; McGregor, 2008; Nadasdy, 2007; Bohensky & Maru, 2011). For instance, Indigenous knowledge is often made to conform to western standards of what constitutes knowledge, and can be marginalized in a context subject to the power dynamics of colonization (Nadasdy, 2007).

Within the resource management process Indigenous knowledge is often made to conform to a western conception of what knowledge is, and it is integrated into a scientific management paradigm further marginalizing the voice of the colonized (Nadasdy, 1999) and leading to epistemological cherry picking (Nadasdy, 2007). This type of integration perpetuates existing power struggles when two different culturally specific, or worldview specific, ways of understanding the relationship between human beings and the environment clash with each other

(Blaser, 2012). The objective of this research is not in any way to facilitate or encourage knowledge integration between Indigenous and western worldviews. Effective and ethical engagement, in the context of this research, means coexistence and respect rather than integration.

Fundamental obstacles to realizing a mutually beneficial relationship in which both science and Indigenous knowledges are utilized to their full potential revolve around the issue of ontology (Blaser, 2012). As Bateson (1972) noted, “ontology and epistemology cannot be separated”, and humans are “bound within a net of epistemological and ontological premises” which become self-validating (p. 314). Without attention to ontology, discrete pieces of traditional ecological knowledge are often integrated into western scientific management regimes while the worldview and ways of being that created the knowledge, and in which the knowledge makes sense, are viewed by many as having little relevant value to resource management (Houde, 2007).

“A focus on fostering partnerships and collaborative opportunities” between holders of Indigenous knowledge and western scientific knowledge is key to leveraging them both to address the challenges of sustainability “without compromising the integrity of either one of the knowledge systems” (Castillo, 2009, paragraph 5). In this context it is inadequate to only give students the knowledge and skills for functioning within society’s existing paradigms (Glisczinski, 2007). Mistaking knowledge for an understanding of the perspective from which it comes does not develop the capacity to relate ethically and effectively with those coming from different epistemological perspectives (Glisczinski, 2007).

With an epistemological and ontological gap preventing effective knowledge co-utilization and understanding between Indigenous knowledge holders and resource managers trained in the tradition of western science (Houde, 2007), ethics within the co-management arrangement is a chief concern (Fennell, Plummer, Marschke, 2008). Without proper ethical consideration, co-management which does not recognize the diverse epistemologies and ontologies of Indigenous peoples will “simply be window dressing for well-established dilemmas of power” (p. 73) reinscribing themselves within the co-management process. Within the context of treaty rights and the legal duty to consult there is a need for the relationship between resource managers and First Nations to become more equitable (Morellato, 2008). The desired positive outcomes of resource co-management processes must be “tangibly expressed through measurable social, cultural and economic benefits within First Nation societies” (Morellato, 2008, p. 2), and not only positive environmental outcomes. Within the co-management process First Nations communities are “not just another stakeholder” (National Aboriginal Forestry Association, 1995, p.2; Government of Canada, 2008), however, due to incompatible ontological orientations it often remains difficult for both western science and Indigenous knowledges to be utilized to their full potential in sustainable resource management (Houde, 2007; MacGregor, 2008; Bohensky & Maru, 2011).

This research takes place in recognition of the fact that “understanding systems of knowledge, beliefs, and values are necessary building blocks to engage in effective dialogue” (Wilkinson et al., 2007, p.31) between worldviews, without the imposition of integration. This research will help us understand how graduate students involved in sustainability education, research, and resource management experienced epistemological stretching, how that epistemic

learning affected their capacity for engagement with sustainability, and their understanding of the ethical implications of working with Indigenous knowledges.

### **Literature Synthesis**

Epistemic learning and epistemological stretching are valuable pedagogical tools in educating for sustainability. Epistemology sits at a nexus point unifying three areas of interest in sustainability pedagogy. Epistemological pluralism is key for engagement with interdisciplinarity and sustainability knowledge creation, can help develop a deeper understanding of the ethical implications and power dynamics inherent in working with Indigenous knowledges, and constitutes a framework for educating in and towards a sustainability oriented paradigm.

## **CHAPTER 3: RESEARCH CONTEXT**

### **ENVS 811: Multiple Ways of Knowing in Environmental Decision Making**

ENVS 811 is based on providing transformative learning experiences to students predominantly raised in, and inhabiting paradigms of thought dominated by a western scientific approach to knowledge. This approach is underscored by a “a positivist/reductionist perspective, which argues that all processes are knowable and reducible to physical, physiological, or chemical events that can be measured using the scientific method” (Weiss, Hamann & March, 2012, p. 287), and the Cartesian separation of the self, or mind, from all matter (Bai, 2009).

The course seeks to facilitate an experience of epistemological stretching and a relational ontology. Taking a holistic approach to sustainability education, and positioning sustainability science as a holistic, transdisciplinary field means the education in this field “must be whole person, whole planet education that is locally and deeply experienced as it engages the rich, but oftentimes dormant (and, by educators, oftentimes left dormant), reservoir of potentials in the learner” (Selby, 2010, p.1). A specific pedagogical focus on epistemology is one way to bring some of this latent potential to life and acknowledge, perhaps accelerate, the “personal and collective transformation inherent in sustainability work” (Burns, 2011, p.2). Teaching towards a relational ontology is meant to bring an understanding of living with Earth, rather than on Earth, and relating in this way insinuates a whole spectrum of other-than-rational ways of knowing. The pedagogy of transformative sustainability learning is meant to make possible new ways of

knowing and being, and foster a relationship that constitutes the basis for a transformed practice and understanding of sustainability. In addition, it should have the effect of rendering (more) valid in the minds of uncertain students the traditionally marginalized aspects of Indigenous knowledge systems.

### **Study Participants**

Eight research participants (graduates from ENVS 811) were invited to participate, and all chose to participate. The participants were selected based on their willingness to participate, their willingness to express themselves in relation to issues of epistemology, and their availability. All participants went into the field to work or conduct research since taking the course. All participants have worked with Indigenous knowledge holders, or self-identified as Indigenous themselves, or worked with local knowledge holders since taking the course. All participants engaged in activities to encourage epistemological stretching while taking the course. Participants were made aware that although their names would not be disclosed, and personally identifying portions of their interview transcripts would be edited or omitted, they may be identifiable by those who know them. I thank them for trusting me with their stories. These participants, students from the School of Environment and Sustainability and overlapping areas of study, gave me the opportunity to find out the implications of the course in their context of application, and assess the value of the course experience to the students after they have had the opportunity to reflect on that experience.

## **CHAPTER 4: METHODOLOGICAL APPROACH – INTUITIVE INQUIRY**

Rosemarie Anderson developed intuitive inquiry “in order to carve creative space or capacity within scientific inquiry for the active contributions of intuitive insights” (Anderson & Braud, 2011, p. 69). Inquiring into the realm of epistemological stretching implicitly requires the researcher to be open to and engage with the full spectrum of capacities available to them for creating, receiving, interpreting and representing knowledge. Given that it explicitly supports using intuitive, analytical, rational and transrational ways of knowing this methodology is epistemologically congruent with the study’s focus. Intuitive inquiry’s value in the context of this research stems from the fact that it “joins intuitive and compassionate ways of knowing to the intellectual rigor of human science research” (Anderson & Braud, 2011, p. 16). It “provides ways to collect, analyze, and interpret data. In addition, intuitive inquiry seeks to speculate about the possibilities implicit in the data and intimate new ways of being human in the world” (Anderson & Braud, 2011, p. 17).

Intuitive inquiry is an approach that has been used to investigate transformative human experiences (Anderson, 2000) in a paradigm that balances and integrates intersubjective data. Examples of transformative experiences investigated with this methodology include “right body size” for women, grief and deep emotions as a response to nature, storytelling and compassionate connection, and joy in union with God in mystical Christianity (Anderson & Braud, 2011). This methodology “encourages new visions of the future” and the resulting research is intended to

“make them possible” (Anderson, 2004, p. 324). In choosing a methodological approach, a researcher is implicitly aligning themselves with particular ways of knowing and the associated values. Intuitive inquiry is chosen here because it embodies the idea of epistemological pluralism, and acknowledges both critical reflection and intuitive relating as valid ways of knowing, both of which play a role in the transformative learning experience. In this research I drew on intuitive insight and inductive reasoning, in alignment with both the methodology and the phenomenon of transformative learning.

### **Self-location**

The subjectivity of the researcher is part of the intuitive inquiry process. As such, this is an opportunity for me to describe who I am and what I bring to this study. I grew up in Kentucky, in the city of Lexington. My parents were both present in my life, they were divorced when I was young, and they both lived in Lexington until my twenties. My father worked as a physics professor at the University and my mother worked as a social worker. I have a younger brother, and he and I were partners in essentially all endeavors until I graduated high school and moved out. Life was good; my parents loved me growing up and made rewarding opportunities available to me through music and sports. When I was 12 my father took sabbatical to Munich, Germany and my brother and I had the opportunity to live there for a year. This was the first experience I had which forced me to re-examine myself, my beliefs about the ways that people can live, and it changed my understanding of the world in a profound way by exposing me to more of it.

This sustainability oriented path opened up for me as an undergraduate. I began to learn about the nature of the mountaintop removal coal mining taking place in eastern Kentucky, the climate disruption and its connection to over-reliance on fossil fuels. I cut my teeth in community



organizing during this time, studied organic agriculture and also developed an affinity for wisdom traditions of the east; martial arts, yoga, meditation. I had the opportunity to work for a time as the sustainability coordinator at a large University, then travelled throughout the United States, and made my way to live and work in Japan, travel in India, and return to live for a time in Kentucky before moving to Saskatoon to study at the University of Saskatchewan.

I value unique experiences which take me out of my comfort zone, force me or allow me to grow as a human being, or present me with a previously unconsidered perspective or aspect of life. I am heavily influenced by the Zen teachings which are coupled with traditional Japanese martial arts, and my experiences lead me to believe there is a great deal of value and guidance to be offered at the modern conjuncture by ancient wisdom traditions. I believe that within the ecological reality education as it is commonly practiced in North America values instrumental knowledge too highly, and places too little emphasis on the cultivation of wisdom, or a sense of propriety with regards to how knowledge is applied.

With these views influencing my perception I enrolled in ENVS 811 my first term in graduate school. Over time, and due in no small part to my participation in the course, it became clear my research would focus on transformative sustainability learning experiences, and how an expansion of the ways of knowing that a student is able to engage with can contribute to that learning experience. Four of my research participants were in the same course that I was, and the others were in the course in the previous year. I had developed some rapport with each of my research participants as friends and peers, and we had a mutual basis of shared experience from the course that made our interviews easier to conduct. My understanding is that, within an

intuitive inquiry interview, knowledge is co-created by both the researcher and the participant, so having that shared experience helped us communicate effectively.

To inquire into the area of multiple ways of knowing in this manner implies that I value diversity, and value a multiplicity of perspectives. Similarly, to talk about it in this thesis requires multiple ways of telling the story, multiple ways of expressing the ideas. In my collection of the data I did not wish to influence the language choices of any of my participants when they expressed themselves about other-than-rational ways of knowing. Similarly, in interpreting and reporting it, I do not wish to homogenize the language because the experience of epistemological stretching is different for everyone. Words such as intuitive, trans-rational, spiritual and somatic are used in this thesis to describe the ways of knowing students self-identify with. While there are many differences and nuances between these epistemological spaces, and those nuances are important, the differences between them all is not central to the research question at hand. My primary consideration when interacting with the data is, regardless of how a student chose to express themselves with regard to the ways of knowing they self-identify with, did the learning experiences take them into new epistemological spaces, and if so how did that contribute to the perspective transformation inherent to transformative sustainability learning? Having said that, however, it is important to be clear about what I, as the author, mean when I use these terms intuitive, somatic, transrational, and spiritual.

Transrational does not describe a way of knowing per say, rather it is a quality ways of knowing can possess. Transrational knowing incorporates and integrates, but does not privilege, rational knowing with non-rational means of encountering knowledge. An example of this could be dream knowledge, which is encountered in a dream state, but often presents further meaning

when critically reflected upon in a waking state. Intuition refers to a process of coming to know without inferring through reasoning, or experiencing the environment empirically. Intuition is not a result of inferences, but is spontaneously present in the awareness immediately, or through a process contemplation and introspection. Spiritual knowing results from a connection with the spiritual world, and was particularly central for one of the Indigenous participants. This type of knowing arises through relating with the spiritual world that the physical world is embedded in. Somatic knowing refers to knowing that occurs corporeally, in an embodied way. To varying degrees, each student self-identifies with one or more of these ways of knowing. In all but two cases this self-identification became more prominent as a result of epistemological stretching (two students reported that they identified with some of these ways of knowing strongly coming in to the course), and these are the spaces into which the students took their epistemological stretching.

### **Intuitive Style**

My intuitive style is most heavily influenced by martial art training, specifically Japanese budo, which is closely associated with a Zen aesthetic and philosophical orientation. A martial artist is most efficacious moving from a place of mushin, or no-mind. The practice itself, at a fundamental level, is designed to cultivate a benevolent heart in the practitioner. With a benevolent heart, and moving from a place of no-mind, the martial artist develops shinshin shingan, or the mind and eyes of god, over the long course of their practice. In this way, the martial artist has as the goal of their training harmonization with the scheme of totality, and will naturally take right, just, and appropriate action guided by an intuitive knowledge of the playing out of fate. This is the aspect of budo that makes it a spiritual way. The martial artist is meant to

use their capacities without evil intent, and become an instrument of natural justice. One of the hidden teachings within budo is mejutsu, or the technique of seeing reality. This is what I aspire to, and it defines both my intuitive style and my approach to sustainability. This practice is meant to develop the intuitive ability to see the real meaning of something, see to the core of the matter, to see the reality unencumbered by the ego's perceptions or any negative intentions.

Another important element of budo that informs my intuitive style is the idea of the martial arts conversation. The conversation is a metaphor for the martial arts training itself. The conversation, between two (or more) people, takes place in the language of the basic techniques of the martial art. In this conversation both parties involved are receiving and transmitting; martial arts conversation is the epitome of knowledge co-creation, but also knowledge discovery, because that knowledge was part of the art before you encountered it. I approached this research from the perspective that there are qualities of epistemological stretching that I and other students had experienced, and we needed to enter into a conversation to manifest our understanding of this epistemic learning experience. The concept of martial arts conversation aligns itself well with intuitive inquiry because both are not only a verbal conversation. This inquiry, and martial training, both engage the whole person, and asks them to cultivate spirit, involves somatic capacities, and does not privilege rational thought but values it as one of many tools for deepening understanding. I tried to enter into a conversation possessing the aforementioned qualities with my participants, with the data, and with the methodological process. These concepts heavily influenced all aspects of, as well as describe the process of, data collection and analysis, and the initial identification of the research area. Some of my best breakthroughs in this research project, as well as the data collected in the interviews, emerged from this dialogic

model. It is also my hope that this thesis maintains a conversational, personalized quality, while maintaining the structure of the 5 Cycles, while making a valuable contribution to transformative sustainability learning research.

This idea of the martial art conversation is the key element that can explain how my intuitive style influenced this research process. In such a conversation things can emerge which neither party was aware of, capable of, or able to articulate before that moment. It is a process of knowledge discovery as much as knowledge creation. The knowledge emerges from the interaction of two people who embody the martial arts training, or in the case of this thesis, embody the experience of epistemological stretching. There is space within this methodology, in fact it is even encouraged, for the researcher to embody the transformative experience being investigated (Anderson & Braud, 2011) and embrace their subjective contributions to the knowledge discovery process.

These two concepts, seeing the implications and meaning, and the martial arts conversation, have influenced this entire inquiry, from data collection, to analysis and interpretation, to the way I have written this thesis. They govern my intuitive approach.

## **CHAPTER 5: INTUITIVE INQUIRY: FIVE CYCLES OF INTERPRETATION**

The structure of an intuitive inquiry consists of 5 iterative cycles of interpretation. Anderson and Braud (2011) describe them as:

Cycle 1: Clarification of the research topic through a creative process, leading to a precise articulation of the research topic.

Cycle 2: The researcher reflects upon their understanding of the topic, explores the literature and research, and prepares preliminary interpretive lenses. The interpretive lenses are used to describe the researcher's understanding of the phenomena under investigation prior to data collection.

Cycle 3: Gathering of data takes place, and descriptive findings are conveyed, inviting interpretation by the reader.

Cycle 4: The researcher provides a set of interpretive lenses informed by the experience of data collection, analysis, and interpretation and compares these lenses with the ones from cycle two in order to refine and articulate new understandings.

Cycle 5: The researcher integrates the interpretive lenses with understanding from relating literature, and discusses the implications of the research.

(Anderson & Braud, 2011, p. 28).

A detailed account of each cycle follows.

## **Cycle 1: Topic Clarification**

The purpose of Cycle 1 is to identify the research topic. Central to this process is selecting a text or image that claims the researcher's imagination. This is accomplished using a contemplative practice, followed by reflection on how this text or image illuminates one's area of research. This process was engaged iteratively throughout Cycle 1 in order to focus in on the research question. In completing Cycle 1, two key texts highlighted the most appropriate area for this inquiry. Cycle 1 is meant to "clarify and refine" the subject of inquiry and identify a topic "based on the unique passions and interests" of the researcher. The text identified in Cycle 1 "relates in a general, and sometimes initially ambiguous way" to the research being conducted (Anderson & Braud, 2011, p.31).

In finding a text to enter into dialogue with I was drawn to a body of work I have been familiar with for quite some time. Wendell Berry is a well-known and respected writer and agriculturalist from my home state of Kentucky. His writings contain the wisdom of a long life, well lived, in close connection with the land he calls home. My experiences working in the areas of sustainability and community organizing prior to beginning my Master's degree laid the groundwork for my understanding of the epistemological values that enable diverse peoples to talk past one another when speaking of their relationship to the Earth, validate environmental destruction in the name of progress, and cultivate through education communities of experts who are knowledgeable but ignorant in their application of the knowledge. I found myself continually returning to this passage from Wendell Berry:

Ignorance, arrogance, narrowness of mind, incomplete knowledge, and counterfeit knowledge are of concern to us because they cause destruction. When united with great

power, they cause great destruction. They have caused far too much destruction already, too often of irreplaceable things. Now, reasonably enough, we are asking if it is possible, if it is even thinkable, that the destruction can be stopped. To some people's surprise, we are again backed up against the fact that knowledge is not in any simple way good. We have often been a destructive species, we are more destructive now than we have ever been, and this, in perfect accordance with ancient warnings, is because of our ignorant and arrogant use of knowledge.

(Berry, 2005, p. 59)

Knowledge gained through the study-of subsumes wisdom and understanding gained in relation-with. Though I had some understanding of the epistemological incongruence that objectifies knowledge and positions some knowledge systems as powerful and valid, and others as parochial and invalid, my studies at the University of Saskatchewan helped this understanding to coalesce and deepen.

A second key text came in the form of raw data collected for a research project on threshold concepts from students who also participated in ENVS 811 that I was a research assistant on. Threshold concepts are “conceptual gateways or portals that lead to a transformed view” (Meyer & Land, 2006, p. 19) of a subject matter. Grasping these concepts opens up new ways of thinking about, perceiving, and enacting knowledge. The threshold offers a rich visual metaphor for understanding how learning occurs, and students were asked to fill out a chart describing their perception of and experience with the threshold concepts that helped them engage with multiple ways of knowing in environmental decision making. The depth of feedback, and the way that articulations of epistemological stretching were described as aspects



of a perspective transformation gave further credence to the idea that there is a relationship between the two which warrants further exploration. The following chart was used to collect the data.

**Threshold Concepts** (compiled from ENVS 811 classes 2011 & 2012)

Please fill out the chart as best you can. Only fill in those sections that apply to you. For example, if one of the threshold concepts, or one aspect of the concept identified was irrelevant or not important to you, leave that section blank. If you re-learned or re-encountered the concept in the course, please explain how you learned it the first time, and what we did in the class that assisted you to re-learn it.

<i>there are different ways of knowing</i>	<i>worldview is the lens through which we experience reality</i>	<i>transrational intuition and embodied knowing is a valuable and valid way of knowing</i>	<i>we can communicate with nature and nature can communicate with us</i>	<i>academia can and sometimes does support transrational intuition and embodied knowing</i>	<i>knowing is relational</i>	<i>integration of TEK into current decision-making processes is disrespectful</i>	<i>Other concept(s) not identified (add your own!)</i>
What does this mean to you?	What does this mean to you?	What does this mean to you?	What does this mean to you?	What does this mean to you?	What does this mean to you?	What does this mean to you?	What does this mean to you?
How did you learn this?	How did you learn this?	How did you learn this?	How did you learn this?	How did you learn this?	How did you learn this?	How did you learn this?	How did you learn this?

**Troublesome:** counter intuitive and initially difficult to understand. They may also clash with currently held values and conflict with one's current world view.  
**How was this concept troublesome to you?**

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**Integrative:** the new concept is integrated into one's existing ways of thinking. **Did you integrate it into your existing ways of thinking? How?**

--	--	--	--	--	--	--	--

**Irreversible:** once mastered, it is difficult to return to one's previous ways of thinking. **Is this concept irreversible for you? Explain. If it isn't irreversible, what is changing things for you?**

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Figure 1. Threshold concepts of epistemological pluralism assessment chart

The threshold concepts were articulated by students of the course in collaboration with the instructor M.J. Barrett. The threshold concepts assessed were as follows:

1. There are different ways of knowing.
2. Worldview is the lens through which we experience reality.
3. Transrational intuition and embodied knowing are valuable and valid ways of knowing.
4. We can communicate with nature and nature can communicate with us.
5. Academia can and sometimes does support transrational intuition and embodied knowing.
6. Knowing is relational.
7. Integration of traditional ecological knowledge into current decision making processes disrespectful.

These were the threshold concepts of engagement with epistemological pluralism, as identified by students of ENV5 811. The research into these threshold concepts has continued to refine and distill them, but at that earlier stage in the research process this is the list we were working with. The chart was used to collect data on the student perceptions of these concepts in order to assess whether or not they truly possessed the qualities of threshold concepts as described in the literature (see Meyer & Land, 2006).

The experience of working with the data collected using the charts gave me the impression there is potentially rich, nuanced data related to epistemic learning experiences which

took place in ENVS 811. These threshold concepts have since been refined (Barrett et.al., forthcoming) to:

1. Worldview is the lens through which we experience reality;
2. There are different ways of knowing
  - a. Transrational intuition and embodied knowing is a valuable and valid way of knowing;
  - b. Knowing is relational;
  - c. We can communicate with nature and nature can communicate with us.
3. Discourse supports and/or undermines particular ways of knowing and being as valid, useful and accessible.

Through my participation in course work, my experience as a research assistant, and my own inquiry and learning process, it became clear that epistemology is a nexus point for critical examination as we move forward with the project of educating for sustainability. As a result of Cycle 1 I came to inquire how a pedagogical focus on epistemological stretching can facilitate transformative sustainability learning experiences.

## **Cycle 2: Preliminary Lenses and Understandings**

The purpose of Cycle 2 is the articulation of the researcher's preliminary understanding of the subject matter before data collection begins. In Cycle 2 the researcher makes clear their

“personal values, assumptions, and understanding of the research topic as preliminary interpretive lenses prior to data gathering” (Anderson & Braud, 2011, p.39). These lenses are continually refined until the beginning of Cycle 3, at which point it is no longer possible to return to understandings prior to investigation. Along with my own preconceptions and perspective, the Cycle 2 lenses were informed predominantly by readings in the area of transformative sustainability learning, and broad readings in the areas of interdisciplinary knowledge creation for sustainability, natural resource co-management discussions, and various articulations of the paradigm shift intimated by sustainability (see literature review above, and reference list). The lenses are as follows:

Preliminary lenses for understanding how an epistemological focus, and epistemological stretching, can contribute to transformative sustainability learning are:

1. The purpose of transformative sustainability learning is to facilitate new ways of knowing and being human-in-relation
2. New possibilities of knowing and being are opened up with a focus on epistemology
3. A focus on epistemology can deepen and actualize engagement with social and ecological justice
4. Epistemological stretching can result in less rigid patterns of thought and confer new ways for students to construct their own meanings
5. Epistemological stretching requires mindfulness and exposure to knowledge and ways of knowing outside those currently used
6. Challenges to epistemological assumptions can challenge the identity of the holder of those assumptions

7. Challenges to epistemological assumptions can precipitate epistemological stretching or resistance
8. Epistemologies are associated with value systems. Epistemological stretching may be associated with axiological stretching.
9. Students do not always view their fields or communities of practice as welcoming to other-than-rational epistemological perspectives

### **Cycle 3: Data Collection and Representation**

In Cycle 3 the researcher has four key tasks. The researcher “(a) identifies the best source(s) of data for the research topic, (b) develops criteria for the selection of data from among these sources, (c) collects the data, and (d) presents a descriptive summary” (Anderson & Braud, 2011, p. 45). A qualitative inquiry into students’ experiences of epistemological stretching is proposed, using semi-structured interviews as the primary research approach.

Because this study is essentially descriptive, in-depth interviews were used. This study has two major lines of inquiry. The first focuses on developing a rich picture of participants’ experiences of the phenomenon of epistemological stretching. These thick descriptions were followed by a line of questioning that delved deeper into the implications of epistemological stretching as a focal point for teaching and learning for students of sustainability. Each interview was based on the same interview guide, which follows, and the same approach of creating an open space for the discussion of and engagement with multiple ways of knowing was used. I tried to create space for the participants to express themselves in whatever way they thought was most relevant to the question at hand, and did not attempt to guide them toward any particular

terminology to describe their experience. By the last interview I was not encountering new content, rather personalized expressions of what I perceived to be the same ideas.

Interviews were conducted in a semi-structured manner. In accordance with the methodological approach of intuitive inquiry the key questions of the research and an intuitive read of what was needed at the time guided the line of questioning. I tried to maintain a conversational quality to the interviews while still utilizing structure to help with issues of data organization and consistency. A dialogic model, in which both parties construct meaning through conversation, permitted the development of “a more complex understanding of the topic” (Rossman & Rallis, 2012, p. 178). The interviews themselves evolved slightly, while still adhering to the structure, based upon the development of understanding that occurred from one interview to the next. I was fortunate in that “the conversations with the subjects extend and alter the researcher’s understandings of the phenomena investigated... One of the main purposes of an exploratory study is the discovery of new dimensions of the subject matter” (Kvale 1996, p. 100). When new dimensions presented themselves, and opened up new lines of inquiry, I wanted to be in a position to pursue them freely as my understanding developed. Each interview was between 45 minutes and 1.5 hours in length. Each participant was approached individually and invited to participate, either through email or an in person request, and participated knowing their contributions would be included in this thesis. There was an option for follow-up with participants to clarify any ambiguities that persist after the interviews, via email. Interviews were transcribed verbatim, excluding stutters, and words such as “um”. Transcripts then were returned to participants for sign-off.

Interviews focused on:

1. Descriptions of epistemological stretching and participants experiences of that.
2. Implications of epistemological stretching.
  - a. What do you do differently? Do you think and feel differently?
  - b. What new possibilities can you imagine after epistemological stretching?
3. What other things were essential to your learning?

This focus enabled the research to: (1) Describe the experience of transformative sustainability learning and epistemological stretching from the perspective of the students, and (2) Identify the implications a focus on epistemology, and epistemological stretching had on their conceptualizations of sustainability, and the contextual dynamics of the socio-ecological systems in which they act.

### **Interview Question Guide**

Interview questions were primarily split into two categories: those that sought to elicit responses descriptive of the phenomenon of epistemological stretching, and those that sought to elicit the implications of the experience. The question guide was structured to begin the interview talking about experiences prior to the course and what students brought with them, proceeding into their experience during the course, and then inquiring as to how their experiences in the course have influenced them after the course was finished.

#### ***Before***

Please tell me about your academic journey prior to taking ENV5 811.

- How did you wind up in ENV5 811?



- What was your disciplinary background coming in to the course?
- What prior research courses had you experienced?

***During***

What was it like taking ENVS 811?

- How did ENVS 811 build on/develop your disciplinary foundation?

Did the course offer any new experiences?

- Did you encounter insights or perspectives that you hadn't considered previously? Please elaborate.
- What barriers, issues, or problems did these new experiences present?

What was the course's biggest contribution to your overall experience in graduate school?

- What do you say/have you said when you try to describe the course and its content to others?
- Has any content/protocol/technique from the course has been particularly useful to you? If so, which ones(s)?
- Before taking the course, what did the phrase "multiple ways of knowing" mean to you?

What did you learn about multiple ways of knowing during ENVS 811?

- How was it similar or different to what you learned before?

What does multiple ways of knowing in environmental decision making mean to you?

- Has this meaning shifted as a result of participating in the course?
- How does it relate to interdisciplinarity?
  - i. Sustainability?
  - ii. Indigenous engagement?
  - iii. Solution of complex environmental problems?

Tell me about how your views and understandings may have changed due to things you learned in the course.

- How has this changed the ways you relate to nature?
- Has this changed your views on other knowledge systems?
- What contributed to this change in views or understanding?

When, if at all, did you first experience or notice something that stretched your conception of knowing?

- Could you describe the events that led to this experience
- Tell me about your thoughts or feelings while learning this.

Were there any experiences in, or as a result of the course, that you found particularly challenging?

- Could you describe any intense feelings or thoughts that you experienced during the course?
- How have you grown as a person since beginning graduate school?
- Did you discover or develop any personal strengths as a result of being in the course?

### ***Implications***

What are some examples of ways that participating in the course influenced your own beliefs/values/practices and or assumptions?

- Have your epistemological assumptions shifted?
- What implications do the inclusion of multiple ways of knowing have for interdisciplinarity?
- What implications do the inclusion of multiple ways of knowing have for sustainability as a field?

Are there any specific situations you have been in through school or work that the course content helped you make sense of?

- How did it help?

How has or may your experience in the course help you relate to Indigenous knowledge or Indigenous knowledge holders?

- Can you give an example?

Have you experienced any changes in the ways of knowing you have or might employ/use as a result of participating in the course? Please elaborate.

- Have you experienced any changes in your views on and acceptance of ways of knowing you do not use? Please elaborate.

### *Closing*

What else was prominent in shaping your experience in ENVS 811 and after?

- Given what we have discussed, what new possibilities or implications can you imagine?
- What other things that occurred in the course were essential for your learning experiences? If you didn't have \_\_\_\_\_ your learning experience would not have happened

Is there anything you would like to ask me or comment on?

Is there anything you would like to add?

### **Cycle 3: Data Representation**

Analysis of interview data was based on thematic coding using the methodological processes for conducting an intuitive read (Anderson & Braud, 2011), and time spent immersed in the data, reading and re-reading. Initial coding was done by listening to the interview recordings, and using paper copies of the transcripts which I cut, and organized into related piles of excerpts. I then put this coding structure into Nvivo, with slight modifications resulting from a second pass at data organization. As per intuitive inquiry, an intensive data analysis and interpretation beyond thematic coding did not occur until Cycle 4. The purpose of Cycle 3 is to collect the data and represent it as clearly as possible to allow the reader to make their own meaning prior to encountering the researcher's interpretations. Though some amount of interpretation is implicit in any representation of data, the purpose of Cycle 3 is to present descriptive accounts, summarizing the data without constructing significant meaning about the phenomena. The presentation of compiled data for Cycle 3 follows, organized using the three main research questions:

- In what ways can epistemological stretching help students engage in more effective and ethically appropriate ways with Indigenous peoples and their knowledges?
- In what ways can educating for epistemological stretching result in new ways of thinking, valuing, doing?

- In what ways can a focus on epistemology help enable perspective transformation implicit in a transformative learning experience?

Quotations are organized into major themes relating to the 3 main research questions.

Within each of these sections data is further organized based on the thematic coding structure which arose while initially making sense of the data, and informs the Cycle 4 lenses. Quotations are excerpted into a short form to address the specific point identified by each theme.

For each of these sections one quotation that is characteristic of it is underlined at the beginning, and the rest of the data excerpts within that thematic area follow. All transcripts in this thesis are coded based on the Nvivo node structure. Each quote presented is labeled. Using (DTSL 1.3) as an example, the acronym refers to the thematic area to which the quotation was coded, the first number refers to a specific participant, and the second number to a specific quotation.

### **Thematic Data Excerpts**

*Can a focus on epistemology help enable perspective transformation implicit in a transformative learning experience?*

- *Shift in outlook, perspective, decision making*

Just gave me a different outlook, impacted maybe how I dealt with stress, how I made decisions throughout grad school, a little bit of my perspective. (DTSL 3.3)

... it's so hard. Lots of responsibility, lots of healing. It's a huge job. The way that people are doing it, they need to be really brave to do it. How I understand from deep in depth, it's a huge, big, moral spiritual, work... (DTSL 2.1)...the classes like multiple ways of knowing that [instructor] did is one of the tipping points I think, towards many, many small tipping points towards having a big one...(DTSL 2.3)...I think overall it helped me see the world in a bit of a different way...(DTSL 3.3)...including multiple ways of knowing in education would make a huge difference, but multiple ways of knowing, and the way we learned about it, where you see it as a different worldview...(DTSL 3.5)...but they're still not getting that it's a fundamentally different worldview. So I think education about multiple ways of knowing, in that respect, would help...(DTSL 3.5)...I don't know necessarily how much that has changed, other than I now see their beliefs as their worldview and their reality, not just their religion...(DTSL 3.7)...Or just to be, almost, yeah...(DTSL 3.8)...I just talked about us in the course trying to find a connection with nature.... People would ask what's the point of that?...(DTSL 4.1)...I think I can be kind of abrupt sometimes, and so taking this course allowed me to be a little bit more sensitive I think. I think I definitely gained appreciation for other... new ways of knowing that were foreign to me... (DTSL 4.2)... Even since [instructor]'s class, I still think my perspective is changing... (DTSL 5.1)...the separation between nature and humans, we've created this conceptual divide, which really doesn't exist. It breaks down all the time. When you feel the wind on your skin its breaking down...(DTSL 5.2)...it has something to do with the way we treat the natural world, but if we thought about the natural world differently, we would be forced to treat it differently, and nobody wants to change, nobody wants to take that responsibility... (DTSL 5.2)...I think that

they do see the world; some of them at least, do see the world very differently...(DTSL 5.4)...I think it's taught me to not look at these feelings as distractions, but instead as a source of creative energy... (DTSL 6.1)...It's helped me to find some of the ideas that I've needed to write a more complex and synthesized thesis...(DTSL 6.1)...I feel like those things, even though I am not writing my thesis in these moments, it's actually helping me to pull everything together...(DTSL 6.1)...At a different point, right? I was here, but now I can try to just... in a circle right.... I don't know if you understand... (DTSL 7.1)... The course gave me a very different perspective of environmental management/understanding – a more holistic, intuitive and deeper look into the connection that we (humans) and animals have with each other (and nature)...(DTSL 8.1)...

- *Multiple ways of knowing as an access point to other worldviews and ways of being*

Yeah, so I think including multiple ways of knowing in education would make a huge difference, but multiple ways of knowing, and the way we learned about it, where you see it as a different worldview and not just an issue of cultural respect, or racism or whatever. Because I think what happens now is a lot of researchers do try to be trained in those things, and they come in, and they don't want to be racist, but they're still not getting that it's a fundamentally different worldview. So I think education about multiple ways of knowing, in that respect, would help. (DTSL 3.5)



...But for me, I don't do that I don't believe in.... well anyways. It's more of a jump I guess, because I am not actively praying to something I can't see, or believing in something I can't see. Whereas when I come to other ways of knowing, you can't succeed in that class unless you can figure out a way to do that... (SCMWK 1.2)...when I thought multiple ways of knowing... I was more thinking in terms of co-management. So sort of a science based approach to wildlife and sustainability, not actually different worldviews...(DTSL 3.4)...including multiple ways of knowing in education would make a huge difference, but multiple ways of knowing, and the way we learned about it, where you see it as a different worldview and not just an issue of cultural respect, or racism...(DTSL 3.5)...but they're still not getting that it's a fundamentally different worldview...(DTSL 3.5)...beliefs as their worldview and their reality...(DTSL 3.7)...It was a different way to be...(DTSL 3.8)...That's one thing I think the course really contributed to my graduate learning, was my ability to interact with people who have a different way of viewing the world, and I think that helped me in my field work...(DTSL 4.2)...if we thought about the natural world differently, we would be forced to treat it differently, and nobody wants to change, nobody wants to take that responsibility...(DTSL 5.2)...didn't conform to the rational, we have to do this in this way sort of way of doing things. And I appreciate that now a lot more than I used to... (DTSL 5.4)...Well it depends in which way you would like to know that, because there is the way that I explain it, and the way that it looks in the physical world, its different you know. I can tell the story in terms of the physical world, in terms of the spiritual world, because I am an Indigenous person and I live in the world of the spirits... (SCMWK 2.1)...While someone may look at those kind of thoughts, or pulling knowledge form trees and things like that as distracting...(DTSL 6.1)...I think it could encourage cross

collaboration and just open people minds up...(DTSL 3.6)...Therefore, yes – a different insight on how we perceive and understand the world around us. It really hit home that not everyone processes their surroundings the same way – that some people truly feel that nature speaks to them, rather than being inanimate objects in the environment (trees, rocks, streams, etc)...(DTSL 8.3)...

- *Relationship reconceptualizations (between beings and epistemologies)*

[x5] mmmhmm, and I think that we as human beings often, and I have been reading a lot recently about the separation between nature and humans, we've created this conceptual divide, which really doesn't exist. It breaks down all the time. When you feel the wind on your skin its breaking down, but people really hang on to it. It's very meaningful, and I don't think its meaningful in a constructive sort of way.

[mdh] Hmm, why do you think people hang on to that?

[x5] I think people are afraid of nature. And I think people are afraid of... I don't know if it has something to do with the way we treat the natural world, but if we thought about the natural world differently, we would be forced to treat it differently, and nobody wants to change, nobody wants to take that responsibility. Because it requires taking responsibility for your actions in a way that we aren't doing now. (DTSL 5.2)

...So understanding their knowledge base, and how spiritual it is, and that it's not just guessing. That kind of thing. Understanding where it comes from. Believe that they are receiving the knowledge that way. Because if you've taken the course you know that you do receive knowledge from whatever your natural being is...(AME 1.3)...that time that was given for us to build our spiritual richness, find wisdom in this life, to improve and develop oneself to better shape, time for finding connections with the spiritual world. That is why I don't like term multiple, because it gives me understanding of multiple truth, but there is only the one truth in the Cosmos, and it is the Creator... (AME 2.1)...in animism, animals and other beings are people. And it's not a symbolic relationship, it's a relationship of equals...(DTSL 3.1)...after they've been exposed to it and they think about it for a while, I think people start to have a little bit more of an appreciation for it...(DTSL 4.4)...we've created this conceptual divide, which really doesn't exist...(DTSL 5.2)...if we thought about the natural world differently, we would be forced to treat it differently, and nobody wants to change, nobody wants to take that responsibility...(DTSL 5.2)...It made me think a lot about aboriginal people, and especially aboriginal people who still maintain a strong connection with their culture; they really do have a different perspective...(DTSL 5.4)...I learned that maybe what I think of as traditional knowledge doesn't encompass all aspects of traditional knowledge, such as spirituality, and a different worldview, things like that...(DTSL 3.2)...including multiple ways of knowing in education would make a huge difference, but multiple ways of knowing, and the way we learned about it, where you see it as a different worldview...(DTSL 3.5)...I definitely gained appreciation for other... new ways of knowing that were foreign to me... (DTSL 4.2)...From this class I was given the perspective of the traditional knowledge, and even though the knowledge

may come from different sources through different processes, it can offer valuable additional information and perspectives on problems. You should never just dismiss possible information...(DTSL 6.1)... The course gave me a very different perspective of environmental management/understanding – a more holistic, intuitive and deeper look...(APE 8.1)...

*Can educating for epistemological stretching result in new ways of thinking, valuing, doing?*

- *Deepened, nuanced understanding of diversity of knowledge systems and worldviews (thus people)*

Just even learning that there are different ways of knowing, and that there are other people that subscribe to them, it's not just some hearsay thing all the time. There are real things out there that, it can get people to, decision makers and resource managers; it can get people to be more open to trying different approaches. I think it's going to be a long time before that becomes acceptable. One, because we need different frameworks that allow for, if that is acceptable, to then actually use the knowledge from them. It won't matter if a job site manager is ok with dowsing for example, but if he has no way to communicate that with someone else, that we dowsed, and this is how we came to this decision. If that's not ok, to give that report, on a large decision being made from that, then he's never going to do it. Or he's never going to tell anyone he's doing. (DES 6.6)

...different ways people process and perceive information and hold knowledge and share that knowledge...(DES 1.1)...if I am going to fully help and understand the people that I am working with then I need to know exactly where they're coming from and why they feel their insight and the knowledge they hold is important and non negotiable... (DES 1.1)...understanding their knowledge base, and how spiritual it is, and that it's not just guessing...(DES 1.2)...Understanding where it comes from. Believe that they are receiving the knowledge that way...(DES 1.2)...because of that I can more easily relate to first nations and metis people. I know the questions to ask....(DES 1.2)...With human components come other ways of knowing that aren't western science, like the vast majority of humans have other ways of knowing that aren't western science...(DES 1.6)...incorporating knowledge about other ways of knowing does is molds the individual so that even if they're not actively searching out other ways of knowing, it's on the back of their mind. That's important for leading to sustainability...(DES 1.6)...when the people talked about energies, about the connections, intuition, all these kind of things, the people started to wake up. And you know, I think each person is looking for that connection with the spirituality, with the spiritual world, with the intuition or whatever you want to call it. Because that is the tunnel from which you have the energy...(DES 2.1)...where you see it as a different worldview and not just an issue of cultural respect, or racism...(DES 3.5)...they're still not getting that it's a fundamentally different worldview...(DES 3.5)...I now see their beliefs as their worldview and their reality, not just their religion...(DES 3.7)...taking this course allowed me to be a little bit more sensitive...(DES 4.2)...to everybody's opinion there are certain aspects that are more truthful, or relevant to the world, than others...(DES 4.3)...But if people do gain an appreciation that there are other legitimate ways of knowing then

they will be less likely to shoot things down right away...(DES 4.6)...I think there is lots of value. Everywhere from interactions those people make in the workforce with other people to the ideas they'll push for... (DES 4.7)...for ecosystem management to be successful, or environmental management to be successful, it's kind of a requirement for.... Otherwise it's just going to continue to be the same that it's always been, something that is just steeped in one tradition... (DES 4.7)...already having had a lot of experiences that don't quite fit. I don't know what else to call them. But the course did help a lot, it made me feel a lot more confident to express those... (DES 5.5)...made me aware that there are more different ways of knowing than I thought there were... (DES 5.5)...multiple ways of knowing refers to a broader range of knowledge systems than just Indigenous knowledges, its referring to the whole spectrum of where knowledge can come from...(DES 6.5)...more open minded to accepting and using knowledge from other and sometimes unexpected sources. Though unconventional, some knowledge can be what is needed to give new perspective to a problem...(DES 6.5)...Through that course I learned that maybe what I think of as traditional knowledge doesn't encompass all aspects of traditional knowledge, such as spirituality, and a different worldview...(DES 3.1)...thinking in terms of co-management. So sort of a science based approach to wildlife and sustainability, not actually different worldviews...(DES 3.3)...Everyone with a different worldview is living on the same earth, but our realities are so different just because of what we believe in and what we choose to believe in....(DES 3.6)...it's just going to continue to be the same that it's always been, something that is just steeped in one tradition...(DES 4.7)...even learning that there are different ways of knowing, and that there are other people that subscribe to them, it's not just some hearsay thing all the time...(DES 6.6)...we need different frameworks

that allow for, if that is acceptable, to then actually use the knowledge from them...(DES 6.6)...What are the different paradigms that exist, for example positivism, or critical or Indigenous perspectives right? That was new for me, as well to understand what ontology is, and what epistemology is...(DES 7.1)... Not necessarily perspectives I hadn't considered previously, but rather a different angle on these perspectives. To clarify, I mean western epistemology (gave this way of seeing the world a name), and aboriginal teachings. Therefore, yes – a different insight on how we perceive and understand the world around us...(DES 8.4)...

- *Epistemological stretching leading to ontological stretching, and shift in understanding of the spaces in which epistemologies exist and interact as ontologically plural*

And I don't know if I ever had that before, anywhere where I could.... I come from a background I think where in my personal life I have sort of denied a lot of that intuitive creative side, and I really believed that we just need to rational, and think things through, and make the right choice based on the facts. Especially when I was in my teens I was very particular about that kind of stuff, and I really thought.... I think it was a sort of coping mechanism, a way to be in control of my environment. Which I've completely changed, I've changed a lot now, I'm much more willing to accept my feelings than I used to be, and I'm much more willing to follow my heart, for lack of other words. So I think I am definitely more open to the idea of intuition, so.... Yeah... (DES 5.1)

...I was thinking more of the actual basis of traditional knowledge. Which is why I end up in my project, I now include local ecological knowledge, which I distinctly refer to as more of an individual thing...(DES 3.1)...Everyone with a different worldview is living on the same earth, but our realities are so different just because of what we believe in and what we choose to believe in...(DES 3.6)...It was a different way to be...(DES 3.8)...that's your reality, but in my reality, what did that event look like?...(DES 3.9)...intention setting, grounding...(DES 3.10)...certain places that I have been before, and I can feel something is really off...(DES 3.10)...I don't know if I ever had that before, anywhere where I could...(DES 5.1)...so suddenly, there were so many connections, I can't even deny them anymore....(DES 5.1)....was going to die before he died, but I didn't know that I knew...(DES 5.3)...would still be denying that, if I hadn't taken [instructor]'s class, but now I'm just, I'm sure that that's what happened....(DES 5.3)...this idea of sustainability, which is very closely linked to the idea of development, which is why we often use the term sustainable development. This is, to me, a paradox....(DES 5.4)...it's just a paradox, it doesn't work, because we've created the problem with this particular way of thinking, and now we're thinking about the problem with the same way. We need to step outside of the box, and think about the solution in a different way than we're thinking about the problem...(DES 5.4)....we got here in the first place was this specific way of thinking about the world, and now we can't solve that by thinking about it the same way....(DES 5.4)... I came in to the course being very open. And already having had a lot of experiences that don't quite fit...(DES 5.5)...the course did help a lot, it made me feel a lot more confident to express those. And it also made me aware that there are more different ways of knowing than I thought there were... (DES 5.5)...made me think a lot about aboriginal people, and especially aboriginal



people who still maintain a strong connection with their culture; they really do have a different perspective....(DES 5.6)...they didn't conform to the rational, we have to do this in this way sort of way of doing things. And I appreciate that now a lot more than I used to...(DES 5.6)...even learning that there are different ways of knowing, and that there are other people that subscribe to them, it's not just some hearsay thing all the time...(DES 6.6)...it can get people to, decision makers and resource managers; it can get people to be more open to trying different approaches...(DES 6.6)...we need different frameworks that allow for, if that is acceptable, to then actually use the knowledge from them...(DES 6.6)... if he has no way to communicate that with someone else, that we dowsed, and this is how we came to this decision. If that's not ok, to give that report, on a large decision being made...(DES 6.6)...I definitely pay more attention to my embodied knowing, trying to understand the things that my body is telling me...(DES 6.8)...Trying to be aware when I get those inklings...(DES 6.8)...not just scientific, it's about traditional knowledge, it's about the sky knowledge, it's about what the living beings convey, it's about every kind of knowledge in this world that is interconnected with our Earth. So now, I can understand, it's not just the knowledge of humans, it's the knowledge of nature as well. That's what I understand now...(DES 7.2)... I can better understand what people mean when they talk about the trees and other living or non-living beings as having spirits and thoughts of their own...(DES 8.12)...

- *Necessity of and ability to show respect and appreciation for “other” knowledge systems*

So that I have definitely incorporated, but other than that, it's the traditional knowledge and understanding, because I do a lot of work with first nations and metis people. So

understanding their knowledge base, and how spiritual it is, and that it's not just guessing.  
That kind of thing. Understanding where it comes from. Believe that they are receiving  
the knowledge that way. Because if you've taken the course you know that you do receive  
knowledge from whatever your natural being is that you selected for that project. So I  
have taken that with me, definitely, and I think that because of that I can more easily  
relate to first nations and metis people. I know the questions to ask. (DES 1.2)

...understanding their knowledge base, and how spiritual it is, and that it's not just guessing...(DES 1.2)...Understanding where it comes from. Believe that they are receiving the knowledge that way...(DES 1.2)....because of that I can more easily relate to first nations and metis people. I know the questions to ask....(DES 1.2)...what I think of as traditional knowledge doesn't encompass all aspects of traditional knowledge, such as spirituality, and a different worldview...(DES 3.1)... I now include local ecological knowledge, which I distinctly refer to as more of an individual thing, versus traditional knowledge, which is more of a cultural, worldview....(DES 3.1)...Just gave me a different outlook...(DES 3.2)...including multiple ways of knowing in education would make a huge difference, but multiple ways of knowing, and the way we learned about it, where you see it as a different worldview...(DES 3.2)...I think what happens now is a lot of researchers do try to be trained in those things, and they come in, and they don't want to be racist, but they're still not getting that it's a fundamentally different worldview...(DES 3.5)...prior to this course I somewhat identified with those Indigenous beliefs anyways, in terms of connection to the land...(DES 3.7)....with some of the energy healing things, I get it, and I 100% believe that energy impacts healing and health...(DES 3.9)...I can be

kind of abrupt sometimes, and so taking this course allowed me to be a little bit more sensitive I think...(DES 4.2)...I definitely gained appreciation for other... new ways of knowing that were foreign to me...(DES 4.2)...I think those times where everyone shared their feelings, in the course, actually was quite helpful for my ability to interact with people with different ways of knowing...(DES 4.2)...the course really contributed to my graduate learning, was my ability to interact with people who have a different way of viewing the world, and I think that helped me in my field work...(DES 4.2)...I just thought there could be some truth to that. I think to everybody's opinion there are certain aspects that are more truthful, or relevant to the world, than others...(DES 4.3)...every statement that somebody said where initially I might have thought, this doesn't really make a lot of sense, I would.... I was maybe more receptive to accepting that there could be, that there is maybe some truth, or the way they're saying it might be trying to reveal something else. I was much more accepting of the legitimacy of what people said...(DES 4.3)...Teaching people that there are different ways of knowing doesn't necessarily mean that people are going to gain an appreciation for those multiple ways of knowing. But if people do gain an appreciation that there are other legitimate ways of knowing then they will be less likely to shoot things down right away. Which is a step towards making decisions together...(DES 4.6)...in my personal life I have sort of denied a lot of that intuitive creative side, and I really believed that we just need to rational, and think things through, and make the right choice based on the facts...(DES 5.1)...I think it was a sort of coping mechanism, a way to be in control of my environment. Which I've completely changed, I've changed a lot now, I'm much more willing to accept my feelings than I used to be, and I'm much more willing to follow my heart...(DES 5.1)...I think I am definitely more open to the idea of intuition...(DES 5.1)...I came in to the

course being very open. And already having had a lot of experiences that don't quite fit. I don't know what else to call them. But the course did help a lot, it made me feel a lot more confident to express those...(DES 5.5)...Now I can understand, and I know how to do it. So that's the interesting thing I think, I can do it. Now I know how to transmit all this information, and this knowledge, to other people...(DES 7.1)...Whereas a lot of the articles and authors in this class that you read were reinforcing the opposite, they were saying that it's just another knowledge system, and it should garner respect because of that, because of its history...(DES 6.4)...was given the perspective of the traditional knowledge, and even though the knowledge may come from different sources through different processes, it can offer valuable additional information and perspectives on problems...(DES 6.4)...should never just dismiss possible information, you should look at it, and you should see, is this something I can make use of? In terms of answering my questions. Or does this help me ask a different question that can help me get to a different answer?...(DES 6.4)...multiple ways of knowing refers to a broader range of knowledge systems than just Indigenous knowledges, its referring to the whole spectrum of where knowledge can come from...(DES 6.5)...being more open minded to accepting and using knowledge from other and sometimes unexpected sources....(DES 6.5)...Though unconventional, some knowledge can be what is needed to give new perspective to a problem...(DES 6.5)...a lot of other knowledge systems I think go the opposite way. That why they're called holistic approaches....(DES 6.9)...e need to understand what is the function of the whole system, so then we can tease out the relationships from how each individual part makes up the whole....(DES 6.9)...today we've lost sight of the importance of the whole, its taking so long to figure out all the different variables, because there is an infinite amount of pieces...(DES 6.9)...multiple ways of knowing can do is

seeing things through these other world views, a lot of them use a more holistic perspective to look at things, and so I think, in efforts to approach problems from a holistic stand point, understanding different ways of knowing can help you gain that perspective, and approach a problem in that way...(DES 6.9)... To consider ‘multiple ways of knowing’ in one’s practices to me is a way of building and maintaining sustainable relationships with others from diverse backgrounds...(DES 8.9)...

***Can epistemological stretching help students engage in more effective and ethically appropriate ways with Indigenous peoples and their knowledges?***

- *The importance of seeing and believing that Indigenous knowledge is real, and valid*

I know in a lot of literature traditional knowledge is viewed as an inferior knowledge system to western science; therefore it’s often dismissed as unscientific. Whereas a lot of the articles and authors in this class that you read were reinforcing the opposite, they were saying that it’s just another knowledge system, and it should garner respect because of that, because of its history. From this class I was given the perspective of the traditional knowledge, and even though the knowledge may come from different sources through different processes, it can offer valuable additional information and perspectives on problems. You should never just dismiss possible information, you should look at it, and you should see, is this something I can make use of? In terms of answering my questions. Or does this help me ask a different question that can help me get to a different answer?

(IE 6.1)

...with traditional knowledge. If you can't see and believe that what these elders are seeing is real, then you're not going to be able to efficiently relay the information to someone else...(IE 1.1)... That you can't just take one course, and all of a sudden, you've got traditional knowledge. It takes years upon years upon years to get to the point where the knowledge you're receiving is trustworthy. To the point where you can share it with others...(IE 1.4)...because from the beginning of my life, my Indigenous background has always been inside me. I always was thinking about that. You want to do that, you want to experience it... (IE 2.3)...I now see their beliefs as their worldview and their reality, not just their religion... (IE 3.6)until that worldview is viewed as... or is respected... I don't think co management is going to work. Because there is going to be that animosity....(IE 4.2)...co management is not about incorporating that knowledge in to environmental management as we know it, it's more about making decisions together...(IE 4.4)...if people do gain an appreciation that there are other legitimate ways of knowing then they will be less likely to shoot things down right away. Which is a step towards making decisions together....(IE 4.6)... think about that kind of interaction you have with a bear, where these people culturally I think they must have been conditioned to be, very respectful, but not afraid of bears....(IE 5.1)....it's just another knowledge system, and it should garner respect because of that, because of its history....(IE 6.1)...You should never just dismiss possible information, you should look at it, and you should see, is this something I can make use of? In terms of answering my questions. Or does this help me ask a different question that can help me get to a different answer?...(IE 6.1)...want to hold them to the same standards so that you can compare them, but it might be unfair to be evaluating them based on those

standards...(IE 6.5)...They are aboriginal people, for example traditional knowledge is a thing, or not? You need to consider them, and listen to what they need, or what they would like to do, what they want to have, right? It's not just your desire, or your wishes, you need to look for their needs and their motivations as well... (IE 7.1)... I better can understand better why certain groups (first nations, for example) get fired up over certain issues, particularly those surrounding activities that are harmful for the environment – it's not a matter of 'ownership' but rather connectedness...(IE 8.1)... Participating in the course has encouraged me to embrace spirituality more so, to not ignore the subtle cues in my surroundings – in nature. It also made me more humble and really try to empathize and see things from different perspectives when discussing things with people...(IE 8.7)...

- *Epistemological stretching as an avenue to understanding (that there are) different worldviews*

I think when I thought multiple ways of knowing... I was more thinking in terms of co-management. So sort of a science based approach to wildlife and sustainability, not actually different worldviews. (IE 3.2)

...I come from a western epistemological background, and I don't think I fully understood WHY or HOW some people are so in-tune with their environment, but I knew some people are just 'that way' and they happen to be first nations...(IE 8.1)... As we talked about in 811, it was seeing the world through a different lens, changing how we see and know things, to appreciate

other perspectives...(IE 8.2)... don't know how to say in English, but it's a legacy right, and you need to respect that. Even how they worked the agricultural aspects, it's a legacy as well. It's something that you, it's a heritage. It's a heritage, and it's for you, right? Sometimes you don't value that, and that's what I am learning, more. I did, but I need to understand more how to connect, and how to try to transmit to people, that they need to respect and listen to aboriginal people...(IE 7.2).....I was more thinking in terms of co-management. So sort of a science based approach to wildlife and sustainability, not actually different worldviews...(IE 3.2)...I do find that I use the phrase multiple ways of knowing to encompass.... I guess different worldviews, and different ways of knowing that go along with those worldviews...(IE 3.3).... don't want to say that what I learned is their worldview necessarily... because that's one issue I have with this class is that you get into weird appropriation issues, so how do I say that I understand where their coming from without saying, oh yeah, I'm totally aboriginal now, I'm just like you....(IE 3.5)....I now see their beliefs as their worldview and their reality...(IE 3.6)... I think I just interact with them on a different level but I don't know necessarily how....(IE 3.7)....But a lot of time the diversity you experience is predominantly cultural, and this focused more on epistemological, and world view diversity....(IE 6.6)...it's based on some really specific interpretations of bear human relationships, and specific ideas about how bears and people should or should not interact, that don't necessarily come from the place, and are rooted in a lot of different cultural baggage...(IE 5.2)...

- *Deepened ethical understanding around the concept of "knowledge integration"*



Teaching people that there are different ways of knowing doesn't necessarily mean that people are going to gain an appreciation for those multiple ways of knowing. But if people do gain an appreciation that there are other legitimate ways of knowing then they will be less likely to shoot things down right away. Which is a step towards making decisions together. (IE 4.6)

...if he is hearing something from an elder saying the creator sent me this message there is no experience in that which is quantifiable by western scientist. But if he can say that this elder had this knowledge that he gained from this many years of being here, then that is easier to justify the validity of I think...(ToI 1.1)...imagine each person, in such a way, has such abilities. Having such power means that you should use only for the good things. If then we start abusing it can you imagine what can happen? It's really bad. We also have bad shamans, you know?...(ToI 2.1)...I don't know because I don't want to say that what I learned is their worldview necessarily... because that's one issue I have with this class is that you get into weird appropriation issues...(IE 3.5)...co management is not about incorporating that knowledge in to environmental management as we know it, it's more about making decisions together. ..(IE 4.4)...Making decisions together. As opposed to integrated, that is what co management is...(IE 4.5)....But if people do gain an appreciation that there are other legitimate ways of knowing then they will be less likely to shoot things down right away. Which is a step towards making decisions together....(IE 4.6)...We want to envision the entire holistic system here...(IE 6.4)...hold them to the same standards so that you can compare them, but it might be unfair to be evaluating them based on those standards....(IE 6.5)...it's a just a way, how did you produce,

how did you consume, and how did you impact the environment and social worlds, not just economical benefits aspect. It's difficult, so they suggested to me, no, you need to try... if you're not just talking innovation you just need to focus.... You're not mentioning economic benefits only, and how to join and explain these ideas was difficult...(ToI 7.1)...

- *“Indigenized” relationships with nature*

But I think fundamentally it's based on some really specific interpretations of bear human relationships, and specific ideas about how bears and people should or should not interact, that don't necessarily come from the place, and are rooted in a lot of different cultural baggage, I think. (IE 5.2)

...Just noticing more, I guess. Especially with the wind, because that was the being that chose me...(MWKRN 1.1)...So I think that the course has brought, just this desire to connect...(MWKRN 1.2)...There was a risk, but you did, because you were open to each other. You really engaged, you had one, same aim, and you did. Ok. So even if you did that energetic soul should be natural enough to have a connection with the whole spiritual world and to give the answer... (MWKRN 2.1)...I am a lot more aware of the potential that comes from nature, in terms of grounding me, in terms of offering insight and guidance...(IE 3.4)...I think also when I am outside and having experiences in nature I now interpret those experiences a little bit differently. I think about them at a different level, in terms of intuitive connections, and energy...(IE 3.4)...prior to this course I somewhat identified with those Indigenous beliefs

anyways, in terms of connection to the land, in terms of spirits...(IE 3.6)... I feel like I've had a strong connection with nature throughout my life, but for somebody who doesn't have a strong connection with nature, not having that just translates into no appreciation...(MWKRN 4.1)...then you should tell the bear, I am just travelling, I am passing on my way and you should pass on yours...(IE 5.1)...these people culturally I think they must have been conditioned to be, very respectful, but not afraid of bears...(IE 5.1)...I don't think people interact with bears that way anymore, there's too much fear, and too much hype, and too much concern with human safety. Which is not... doesn't help anyone...(IE 5.1)...it's based on some really specific interpretations of bear human relationships, and specific ideas about how bears and people should or should not interact, that don't necessarily come from the place, and are rooted in a lot of different cultural baggage...(IE 5.1)...need to be socially accountable to the people around us, and to the environment around us, and we need to see the very real and immediate impacts of our actions...(IE 5.2)...we just live in a world that is divorced from nature and is structured in this really rational way and that makes it very hard to tap in to the intuitive, and to give credit to other ways of knowing...(IE 5.2)...that people, in animism, animals and other beings are people. And it's not a symbolic relationship, it's a relationship of equals...(IE 3.1)...But not in the sense that you go in depth, and try to understand, or try to listen to what the tree is telling you. Maybe not in that way. But I think that experience, to write in the journal, was a good one...(MWKRN 7.1)...

- *Indigenous knowledge in scientific management processes does not always do justice to the system of Indigenous knowledge*

...this was a division between first nation and non first nation in how they understand the system. One of the things we have to do, people come up with all these drivers of changes, and we had around 50 of them. It's hard to think about all those things that are affecting the system at once. So you break them down in to larger groups, so it's easier to work with, and you're simplifying the task. And you kind of narrow all the drivers to three different groups. One of the groups was mostly.... All of the western wildlife biologists, western science trained guys, were basically trying to make the divisions into human values, land use, which is resource extraction and all those things, and then the more environmental things. So they were pretty much trying to make a division between the natural world, the human world, and the things we could measure and the things we can't measure. (IE 6.3)

...feel like people with traditional knowledge have just pulled something out of thin air and want you to believe it because you have to believe it because they're aboriginal or... It's a constant struggle because as long as the western scientist talking to the elder or the traditional knowledge holder feels like they're just doing them a favor, that they have the power...(PES 1.1)...Well it depends in which way you would like to know that, because there is the way that I explain it, and the way that it looks in the physical world, its different you know. I can tell the story in terms of the physical world, in terms of the spiritual world, because I am an Indigenous person and I live in the world of the spirits...(PES 2.1)...It's just a problem of the people that they don't have the ability to see or feel the spiritual world, but it exists, it's everywhere....(PES 2.4)...informing management of species is not necessarily what people want, its IQ governing species. Not informing scientific management of species...(IE 5.3)...the people interacting with

the wildlife feel like they're being restricted....(IE 5.3)...co management is not about incorporating that knowledge in to environmental management as we know it...(IE 5.4)...Making decisions together, as opposed to integrated, that is what co management is...(IE 5.5)... Teaching people that there are different ways of knowing doesn't necessarily mean that people are going to gain an appreciation for those multiple ways of knowing...(IE 5.6)... I know in a lot of literature traditional knowledge is viewed as an inferior knowledge system to western science; therefore it's often dismissed as unscientific...(IE 6.1)... they were saying that it's just another knowledge system, and it should garner respect because of that, because of its history...(IE 6.1)...Because I feel that translating knowledge is problematic. What I mean by that is, when western researchers come in, and they receive this wealth of knowledge, and then generally what happens is they pick out the parts that they want...(PES 3.1)...I was given the perspective of the traditional knowledge, and even though the knowledge may come from different sources through different processes, it can offer valuable additional information and perspectives on problems...(IE 6.1)...this was a division between first nation and non first nation in how they understand the system...(IE 6.3)...the western wildlife biologists, western science trained guys, were basically trying to make the divisions into human values, land use, which is resource extraction and all those things, and then the more environmental things. So they were pretty much trying to make a division between the natural world, the human world, and the things we could measure and the things we can't measure...(IE 6.3)...What is the system, how are we defining the system?...(PES 6.3)...we should be including certain human factors into the more environmental category because those human factors are instrumental in shaping...(IE 6.4)... I didn't really get the whole concept that people literally SEE and FEEL the world

differently...(PES 8.1)....

## **Cycle 4: Re-articulation of the Lenses**

### **Final Interpretive Lenses**

The primary purpose of Cycle 4 is to present a set of interpretive lenses informed by the research. Cycle 4 is the place of deep interpretation and making of meaning. I seek to understand in a more nuanced way the nature of epistemological stretching and how it may contribute to the transformative sustainability learning experience as depicted in the data. During Cycle 4 of this inquiry the interpretive lenses were “refined and transformed” (Anderson & Braud, 2011, p. 53), reflecting the understanding that resulted from data collection and analysis, in comparison with the preliminary understandings.

In this stage the key task of the researcher is to re-articulate the theoretical lenses which describe and explain the phenomenon being investigated. Lenses were “modified, removed, rewritten, expanded” and developed to reflect the evolution in understanding that results from the inquiry (Anderson & Braud, 2011, p. 53). A comparison between Cycle 2 and Cycle 4 lenses, and the story of the Cycle 4 lens development process will illustrate the degree of the changes that occurred and illustrate new understandings of the phenomena being investigated.

### **Cycle 2 to Cycle 4 Narrative**

Within the methodology of intuitive inquiry the transition from understandings of Cycle 2 to Cycle 4 is a central act of analysis. As such, a brief narrative telling the story of that development is in order. Although initially the original 9 lenses developed in Cycle 2 felt

appropriate and insightful, I became dissatisfied with them after conducting the interviews with my research participants. The problem wasn't that they were refuted, or rendered inadequate for explaining things that might occur with regard to transformative sustainability learning, but rather that they feel disembodied, theoretical, obfuscatingly verbose, and detached from a human experience. They very much are intellectual understandings, and they say more about me and the perspective I brought to this research than about the phenomenon of epistemological stretching as it relates to transformative sustainability learning and the research participants' experiences. I will briefly talk about each one, how I feel and think about it now after having immersed myself in the data. The following section was written casually, and for personal purposes as I reconsidered these lenses, but I present it here as written to illustrate my thought process.

**The purpose of transformative sustainability learning is to facilitate new ways of knowing and being human-in-relation**

This is my way of defining transformative sustainability learning. I still feel it is adequate, and the data supports the idea that a reconceptualization of relationships is a part of the transformative sustainability learning experience, but the way that epistemological stretching can facilitate that is not hinted at in this lens statement. This lens is simply a statement of my definition of transformative sustainability learning, and not something that the data is in a position to refute. Although the process of conducting this research has helped me to re-articulate this definition, as you will see in the following section, reorienting it from facilitating ontological possibilities towards facilitating paradigm construction.

**New possibilities of knowing and being are opened up with a focus on epistemology**

The missing word is teaching, “opened up with a teaching focus on epistemology”. This lens implies the epistemic and ontic interconnection that I was aware of before conducting the research and wanted to explore further. Developing an acceptance for intuitive, noetic, or spiritual knowing that wasn’t there before opens up ontological possibilities. Knowing the world differently implies being in the world differently, and understanding the world to have different properties. There can be many stories, within communities and within individuals, to explain these different properties, as evidenced by the fact that I feel compelled to use the words intuitive, noetic, and spiritual to do justice to multiple types of transrational knowing. Whatever stories are used, they add to the transformative learner’s cosmological orientation. This lens is essentially useless due to the lack of depth of understanding of epistemological stretching it expresses, but I do not feel it was refuted in any way by my research. A more accurate articulation of this lens would be “epistemological stretching can grant access to or deeper understandings of other ways of knowing and being.”

**A focus on epistemology can deepen and actualize engagement with social and ecological justice**

This statement is supported by the data collected for this research project. Epistemological stretching can deepen a student’s understanding of social and ecological justice issues. Even so, I feel it is more a statement of fact than an interpretive lens. Within the course the combined effect of an inward looking assessment of your own



standpoint and worldview, and direct and second hand experience of ways of knowing which are often associated with other than modern western worldviews, puts students in a stronger position to appreciate diversity. This works by deepening their understandings of what makes people diverse. Understandings of diversity go beyond culture, to epistemic, ontic, worldview, and cosmological orientation as a basis for conceptualizing the diversity of people and the worlds they live in.

**Epistemological stretching can result in less rigid patterns of thought and confer new ways for students to construct their own meanings**

Part of this one is useful, and the other half not so much. With regard to transformative sustainability learning rigidity of thought has nothing to do with anything. The idea that epistemological stretching can result in less rigid patterns of thought comes from me, and my own experience of expanding the ways of knowing I am comfortable with. Thus, this particular lens is an expression of my own process. The real substance of this one lies in the statement that epistemological stretching can confer new ways for learners to construct their own meaning. That is to say, how someone chooses to understand and interpret their experience. The idea that epistemological stretching can confer new tools for meaning making is supported by the data.

**Epistemological stretching requires mindfulness and exposure to knowledge and ways of knowing outside those currently used**

This is another lens that, after conducting the research, feels too obvious to hold any real meaning. I chose to say mindfulness at the time, and I meant to imply a more detached self-awareness, and both phrases have synonymous meanings for me. I

feel this language choice reflects my own experiences with Zen, and study of Buddhism and in this lens the word “mindfulness” could be replaced with “an understanding of the assumptions implicit in your own worldview”. The idea that epistemological stretching requires exposure to ways of knowing outside of those currently used seems quite obvious now. Into what sort of epistemic spaces is this stretching meant to take you? Examples are necessary; models of what is being stretched towards are essential in this teaching orientation, in order for the student to be exposed to ways of knowing outside of those currently in use and engage with them.

### **Challenges to epistemological assumptions can challenge the identity of the holder of those assumptions**

It is fair to say epistemological stretching *can* challenge the identity of the holder of assumptions which are challenged. However the challenging of identity was not a significant theme across the data as a whole, although it was expressed in a considerable way by a single participant. The counter-point which emerged in the data is that it can validate beliefs the students brought with them to the course, and create space and confer tools for expressing those identities in new contexts. This lens arose from my assumptions about people and their openness to change, and from my interaction with the data contained in questionnaires asking students to identify the threshold concepts of epistemological pluralism (see Cycle 1). The text data is not as nuanced as the expression that takes place in a one-on-one interview. The questions in the chart heavily referenced the language of threshold concept theory, which has an emphasis on troublesome learning and liminal spaces the learners must navigate in order to reach the threshold of

understanding, whereas this research was influenced by the language of transformative learning theory, which emphasizes perspective transformation and reconfiguration of frames of reference. As such, the threshold concepts chart elicited many responses which focused on challenging learning spaces. While I feel this understanding is still valid, due to the fact that it was significant for at least one of my research participants, it was not a significant theme overall in data collected for this research.

**Epistemologies are associated with axiologies. Epistemological stretching may be associated with axiological stretching.**

This is another interpretive lens that I feel is perhaps valid, but rather empty of substantial understanding. It also is an idea that is very much in a space that the data in my research does not speak to directly. After concluding Cycle 3, and working on redeveloping the lenses for Cycle 4, I could not think of a good reason to include this as a central interpretive lens for understanding how epistemological stretching can facilitate transformative sustainability learning experiences. Perhaps this question of how epistemic shifts can result in shifts of value systems for learners is a research question in and of itself for a separate project. However, I do not feel that this concept is central to understanding and interpreting the data I received, even though there are individualized and personalized expressions of this concept which you will encounter later in Cycle 4.

**Students do not always view their fields or communities of practice as welcoming to other-than-rational epistemological perspectives**

Again, when revisiting this lens I felt like it was a simple statement of fact, and not representative of understanding about *why* students view their fields this way, or *how*

they feel about this aspect of their communities of practice. It is however representative of a significant theme in the data collected for this research, and is a concept that will be discussed in the Cycle 4 final lenses, particularly in the area of acknowledgement and deconstruction of power. This was an area where students acknowledged the power dynamics inherent to the structural and procedural aspects of their fields which make the integration of transrational ways of knowing disruptive of the status quo. This lens is also a mirror of my own understanding: integrating transrational ways of knowing in one's own life is one thing, but doing so in a professional or academic context can often be challenging.

While most of the Cycle 2 lenses are relevant statements, few if any represent synthesized understanding. They do, however, represent my early conceptualization of the theoretical space of transformative sustainability learning; they also reflect a budding understanding of the relationship between epistemological stretching and concomitant ontological shifts, and allude to the connection to axiological shifts that is present, but not unanimously voiced in the data. However they also feel fractured, compartmental, and do not reflect the whole-person, embodied understanding the intuitive inquiry process is meant to develop. The fact that they feel inadequate is a good sign that I needed to go through this intuitive inquiry to have something pertinent to say about epistemological stretching as it relates to transformative sustainability learning. After doing data collection, representation, and thematic coding the next task was re-evaluation of the Cycle 2 lenses in light of what I had learned.

Intuitive inquiry includes meditative procedures for interacting with the data. Data analysis can be a primarily mental endeavor, but within this methodology there is a grounding exercise for stilling the mind and body that you engage in prior to conducting analysis. An aspect of this strategy is that a still mind allows the data to signify its own importance, whereas an overactive mind might do the signifying itself (Anderson & Braud, 2011). So I engaged in this meditative practice specifically with the Cycle 2 lenses. Every researcher's intuitive sense and process is different. I would characterize mine as striving to see the 'real' meaning and implications of something, and develop a synthesized, intuitive understanding through inward focused meditation, or outward focused conversation. Following the methodological instructions, I wound up with set of Cycle 4 lenses which deviated only marginally from what was in Cycle 2, and amounted to re-articulations of them with more obfuscatingly verbose language. The problem was that I did this re-evaluation of the lenses with the Cycle 2 lenses in front of me. I referenced them while trying to express them in a more detailed, nuanced way, in an attempt to express the same concepts in light of a deeper understanding of what students had to say about epistemological stretching. This did not, however, lead me directly to the deeper understandings that emerged in the final Cycle 4 lenses (see p. 76), but was instead a point half way between Cycle 2 preliminary lenses, and Cycle 4 final lenses. I will present the scrapped lenses here, with the commentary I wrote at the time on why I thought they made sense. The following section can be skipped or skimmed, if your primary consideration is the final Cycle 4 lenses, and is presented here for the purpose of illustrating my process.

**Cycle 2 lenses** are in bold, and budding *Cycle 4* (quickly scrapped) rearticulations are in italics. For some, brief explanations follow. The bits of writing that follow were never meant for

anything other than my own research process. I am presenting it here unedited in the hope of painting a clear and accurate picture of that research process.

**1. The purpose of transformative sustainability learning is to facilitate new ways of knowing and being human-in-relation**

*The purpose of transformative sustainability learning is to position students to create and enact the sustainability paradigm.*

Students identify multiple ways of knowing as a potential tool for side stepping what we can call the sustainability paradox. This is the idea that the ways of thinking which created the problem are inherently insufficient for its solution. Unsustainability is perceived as an inevitable byproduct of a worldview which reinforces an artificial conceptual divide between humans and nature. An epistemic learning experience helps the students to “see their worldview rather than see *with* their worldview” (Sterling, 2010, p. 23) and as a result allows them to critique and re-articulate some of the assumptions inherent in the worldview of modernity. Multiple ways of knowing is viewed as essential to a holistic approach to sustainability.

**2. New possibilities of knowing and being are opened up with a focus on epistemology**

*Students open themselves to new possibilities of knowing and being with a reflective approach to epistemological stretching*

There is a sense in the data that the experience of epistemological stretching helps the students to access an epistemologically liberated space. There are two basic dynamics by

which this appears to occur. 1. By conferring a validating experience to the students in an academic setting, which reinforces their own pre-existing alignment with, or affinity for, other than rational ways of knowing. 2. Allowing the students to experience and use ways of knowing that were previously marginalized or not considered, as a result expanding the ways of knowing they feel comfortable using, and are able to acknowledge as valid when used by others.

**3. A focus on epistemology can deepen and actualize engagement with social and ecological justice**

*(no changes occurred here)*

Social and ecological justice that doesn't acknowledge the epistemological and ontological dimensions of human diversity is inadequate, and students report a deeper, more nuanced understanding of the diversity among people. This notion of diversity is extended, and acknowledges the worldview and associated ways of knowing of Indigenous people as essential components of Indigenous ways of being that must be respected for effective and ethical engagement with Indigenous knowledge holders to take place.

**4. Epistemological stretching can result in less rigid patterns of thought and confer new ways for students to construct their own meanings**

Rigidity has nothing to do with anything.

*Epistemological stretching gives students new ways to make their own meaning.*

Students report a different array of tools for relating to the world, and receiving and generating knowledge creates opportunities for them to relate to nature in new, more intimate ways, interpret their experiences from new perspectives, and provide examples of different “ways to be” in nature.

**5. Epistemological stretching requires mindfulness and exposure to knowledge and ways of knowing outside those currently used**

*Epistemological stretching is inherently reflexive, and is characterized by simultaneous inward and outward growth*

Simultaneous inward and outward learning takes place. Student relate to themselves, and their world, and must do both for epistemic learning to occur. This relates to lens 2, the idea that epistemological stretching can help open new epistemological and ontological spaces for the students to inhabit. Oftentimes the inward learning is very much about validation, acceptance, and the unraveling of constraining discourses within the individual. The outward learning reflects application of new epistemologies, using them to relate to the world in new ways.

**6. Challenges to epistemological assumptions can challenge the identity of the holder of those assumptions**

*Where epistemological stretching occurs, identity reconfiguration occurs.*



Students report a shift in their own perspective. Thinking, feeling, and doing things differently, which characterizes a transformative sustainability learning experience, is the hallmark of epistemic learning. Students whose experience in the course was less about validating what they already felt and knew, and more about experiencing marginalized ways of knowing for the first time, view themselves and differently in their constellation of relationships in the world.

**7. Challenges to epistemological assumptions can precipitate epistemological stretching or resistance**

*Epistemological discourses are examined and de/reconstructed during stretching.*

The reflective nature of the epistemic learning experience forces students to examine their own assumptions. In some ways epistemological stretching is about learning about diverse ways of knowing; in other respects it is very much about learning about oneself, identifying constraining discourses, and “unlearning” about oneself.

**8. Epistemologies are associated with axiologies. Epistemological stretching may be associated with axiological stretching.**

*Epistemological stretching is associated with axiological and ontological shifts. Seeing your worldview rather than seeing *with* you worldview (Sterling, 2010)*

Epistemological stretching appears to be a threshold which can grant students access to a space of ontological and axiological plurality as well. These new epistemologies are enacted by the students, giving the experience of being human, in relation to the world

and their knowledge practices, an exploratory quality which helps them to respect and appreciate other ways of being and the associated value systems, or enact these other ways of being themselves.

**9. Students do not always view their fields or communities of practice as welcoming to other-than-rational epistemological perspectives**

*Students are able to recognize epistemological power dynamics and discourses in their communities of practice, and separate themselves from them.*

Initially written for no one other than me while I worked on refining the lenses for Cycle 4, these lenses are presented here to illustrate the process. While some of these lenses clearly became more refined, and expressed a more clear understanding of the experience of epistemological stretching, the structure itself felt inadequate, and the tone still felt detached from human experience and de-contextualized.

**Cycle 4: Final Lenses**

The final interpretive lens structure for Cycle 4 came in a meeting between myself, my supervisor and one of my committee members. I was expressing my feelings about the inadequacy of the evolution of the interpretive lenses between Cycles 2 and 4, and I was asked the question “what did you really learn by doing all this?” When I was trying to explain myself with regard to the lenses not feeling like they reflected a synthesized understanding, my advisors

had created the perfect environment for the conversational and co-creational aspect of my intuitive style. I had tried on my own to find a more synthesized way to understand the data for Cycle 4, but the idea for using it as the lens structure did not emerge until this conversation. In answering their question, I quickly identified 5 distinct areas where the data has a lot to say about the relationship between epistemological stretching and transformative sustainability learning:

1. Reconceptualization of relationships
2. Change in perspective and actions
3. Acknowledgement and deconstruction of power
4. Worldview bridging
5. Validation of previously held views

This set of concepts struck me as a very succinct way to express the most meaning from my interpretation of the data. My advisors suggested I explore using these as my Cycle 4 interpretive lenses, and it became clear they could serve as an organizing structure that unified clusters of thematically coded data from the interviews. The Cycle 2 interpretive lenses were understandings and statements about epistemological stretching and transformative sustainability learning. In contrast, the Cycle 4 lenses are conceptual and practical spaces where “stuff happens” for students if they are engaged with epistemological stretching towards transformative sustainability learning. The final lenses answer the research questions, and describe the ways in which a focus on epistemology can contribute to transformative sustainability learning.

This lens structure is considerably more distilled and concise in comparison with the Cycle 2 lens structure. The 5 lenses represent a succinct and accurate way to describe the conceptual spaces in which a pedagogical focus on epistemological stretching can contribute to

transformative sustainability learning. Virtually every data point in this research speaks to one or more of these conceptual areas. They are distilled to the point where the interconnections are plentiful, but they still represent their own distinct conceptual spaces. These are the central themes around which the data organizes itself, the spaces in which learning occurs, and the conceptual spaces that help us make the most sense of the data.

The following section presents the 5 interpretive lenses of Cycle 4 and some meaningful ways in which the data illuminates each of them. Each of the 5 lenses begins with a description of the main ideas to be covered in that section, and the opening paragraphs give an overview of what follows, while highlighting and summarizing the key points. Then we move into the significant themes brought forth in the interviews which show how these conceptual spaces help us interpret the data and derive meaning.

### **Lens 1: Acknowledgement and Deconstruction of Power**

Epistemological stretching both requires and enables an acknowledgement and deconstruction of power on the part of the student, with regard to dominant discourses about what constitutes knowledge. By discourse, I mean the internal and external, mini- and meta-narratives students hold about what is true (Barrett, 2012). These can also be referred to as cultural narratives and are inscribed through everyday thought, action and physical spaces (Barrett, 2005). If the student chooses to analyze the ways their assumptions about knowledge are influenced by the power inherent in narratives of modern western culture it increases their ability to end the reproduction of these discourses, and take up new ones (Davies, 2004). Three key areas which describe the students' experiences of acknowledging and confronting discourses are:

recognizing issues of power in knowledge imposition and appropriation, epistemic hegemony, and contextualized understandings of power within particular fields of practice.

This acknowledgement and deconstruction of power and associated discourses can take place inwardly, in the sense of a student recognizing internally held discursive structures, or outwardly, in the sense that they see discourses at work in their daily lived experiences, or the experiences of others. The discourses which position some knowledges as valid and useful, and others as inadequate and unsound can be observed within the epistemological assumptions of the individual, or contextualized in (for these participants) the fields of sustainability, and resource and environmental management. Much of this section focuses on the power dynamic between Indigenous and non-Indigenous knowledges. Epistemological stretching gives the students an understanding that there are more stories about what knowledge is than the one(s) that they currently embody. A key way the students develop this understanding is by acknowledging and in some cases deconstructing power.

### *Nuanced understanding of power in knowledge imposition and appropriation issues*

All non-Indigenous students expressed a more nuanced understanding of problematic ethical aspects of knowledge legitimization, validation, imposition, and appropriation. Appropriation refers to the taking of knowledge, and imposition refers to its decontextualization and unethical use. In that regard, epistemological stretching takes anti-oppression education into epistemic spaces and heightened students' ability to handle a situation in which multiple knowledge systems are interacting in a tactful way. This ability results from both a clearer

conception of one's own epistemological standpoint and worldview (see Lens 2, Lens 3), and a deepened respect for ineffable and sacred Indigenous viewpoints. One student noted that:

I was very conscious of the impact of my western worldview on any traditional knowledge. So the main thing was that I wanted to make sure I was receiving ... I didn't want to collect knowledge and then filter it through my perceptions, and I didn't want to pick out what was valuable from that knowledge. Because I feel that translating knowledge is problematic. (PES 3.1)

An interesting thing that was constant in all the interviews is that there seems to be no proper verb that feels ethically appropriate with regard to bringing knowledges together. Incorporation, integration, synthesis, on down the line, all those words begin to sound and feel like assimilation because of the power dynamics students acknowledge exists in most contexts where the bringing of knowledges together would occur. "Yeah, the course made me realize, incorporating that knowledge, is it possible? Is it beneficial to do so? Because incorporating is a word that kind of makes traditional knowledge subordinate to..." (PES 4.5).

### ***Epistemic hegemony***

Students recognize, and personally begin to deconstruct, the hegemony of modern western culture to determine what is and what is not knowledge. Linked to an understanding of worldviews (see Lens 4), students were able to deconstruct the hierarchical epistemological relationship modernity places itself in with relation to other worldviews. Additionally, they were enabled or permitted to do things there is no space for within a worldview that only acknowledges modern western culture and its focus on rationality as the dominant way of knowing.

With that experience we went for a walk around, and it felt like, oh, I could do this experience this way, or I could do it this way. Right now, I am doing it this way, in a more intuitive, grounded sense. Does that make sense? It was the same activity, but I was doing it slightly differently. (PES 3.3)

However ambiguous and nebulous this expression may be, it acknowledges there are multiple ways to be, and know, and the student's words suggest she feels as though she has a choice to be human-in-relation to nature differently than she might have previously considered.

Creating a less power and discourse laden space for multiple epistemologies to co-exist, and all be utilized to their full potential, has practical implications for one participant whose work involved community vision and scenario planning. The value here lies in the new understanding that different worldviews can allow one to see different things, rather than just see things differently.

From this class I was given the perspective of the traditional knowledge, and even though the knowledge may come from different sources through different processes, it can offer valuable additional information and perspectives on problems. You should never just dismiss possible information, you should look at it, and you should see, is this something I can make use of? In terms of answering my questions. Or does this help me ask a different question that can help me get to a different answer? (PES 6.1)

The idea that a deeper understanding of multiple ways of knowing can result in not just different ways of addressing the questions one has, but can also give insight into different questions, was valuable to this participant who needed to effectively collaborate with local and Indigenous knowledge holders. The same participant also noted that this expanded epistemic

understandings resulted in not dismissing possibly useful information in a management planning process. “I think from a pragmatic standpoint, and I kind of mentioned this earlier, you shouldn’t really ever dismiss any potential information. The more information you have the better chance you have of making a sound decision” (PES 6.7).

However it is not as simple as just making the information from multiple knowledge systems available, whatever the process in question is. There are hegemonic power dynamics at play in the spaces in which this knowledge would be applied. This participant feels that a more epistemologically plural approach

...can get people to, decision makers and resource managers; it can get people to be more open to trying different approaches. I think it’s going to be a long time before that becomes acceptable. One, because we need different frameworks that allow for, if that is acceptable, to then actually use the knowledge from them. It won’t matter if a job site manager is ok with dowsing for example, but if he has no way to communicate that with someone else, that we dowsed, and this is how we came to this decision. If that’s not ok, to give that report, on a large decision being made from that, then he’s never going to do it. Or he’s never going to tell anyone he’s doing. (PES 6.6)

This statement implies that even if individuals embrace diverse ways of knowing the structures and processes in which they are embedded and the power dynamics these knowledge structures are laden with will not accommodate the application of multiple epistemologies – even though they may be effective (e.g. knowledge that comes through dreams, or dowsing for water). There is a sense from the five participants with the most direct involvement in wildlife management and environmental consultation that even though the management structures of



modern western culture do not accommodate transrational knowing, it is a basic human ability that is often used but not acknowledged.

Here's what I think, I think that outside of the hard sciences, I don't think it's that rare, I just think people don't talk about it that way. And I think that even the hard sciences, particularly field biologists, people that do field work, gather plants, and do wildlife surveys and things like that, I think that this is an innate part of how they come up with their ideas that they want to look at, it's just they don't talk about it, because they know that it won't be accepted. We all engage with this, whether we're aware or not, and some people engage more than others based on their awareness, and their acceptance of it. I wouldn't go and tell a bunch of biologists that I do this, that I... try to open my body to listening to the land, or that sort of thing. Because I don't think that they would respect me for that. They would say, oh, that's weird, but after they would think, oh, I kind of do that too. (PES 6.10)

### *Contextualized understandings of power within particular fields of practice*

Many students developed highly contextualized understanding of the power dynamics within the epistemic spaces of their respective fields. The nature of this understanding is such that the students perceive there to be structural and procedural impediments to the application of multiple ways of knowing to processes taking place within systems of management, governance, and administration based on the western paradigm.

Enacting change in the system we've set up, it's not like it can change overnight, and I think that's a major flaw. [laughter] I think about the structures of wildlife management

all the time, and how, oh we should just do this. But then you realize that no you can't just do that, because you still would have to wear down all these old ideas. Which is kind of what I want to do with my project now. I want to challenge ideas. (PES 5.7)

In this description, power in the structures of wildlife management is concentrated in ideas about the purpose of wildlife management and the nature of the relationship between the human and non-human beings. An arena where modern western understandings of these ideas hold sway is a problematic space for the application of multiple ways of knowing.

I think multiple ways of knowing in environmental decision making doesn't really exist. I don't think people acknowledge that there are other ways of thinking about problems. I think most people, and not just institutions, but also most individual people think that science, and western rational ways of understanding the world, are the right way to understand the world. But I don't agree with that at all. I think that there need to be different ways of understanding. There need to be multiple ways of knowing for environmental decision making to be effective. (PES 5.6)

## **Lens 2: Reconceptualization of Relationships**

There are multiple ways in which this reconceptualization of relationships manifests, and there are different relationships which are re-envisioned as a result of the epistemic learning experience in ENV5 811. This multifaceted idea encompasses the three main relationships that were re-conceptualized: relationship with nature and non-human beings, which includes deconstructing the anthropocentric hierarchy, stronger respect for knowledges that are not yours,

and the relationship between the student and their epistemological discourses. Students also had a great deal to say about why this reconceptualization of relationships is valuable or important to them. The epistemological discourses that came to greater prominence for students were: feeling grounded and deriving creative inspiration from relating to nature on an affective level, attribution of greater consciousness and agency to natural beings, and more respect and nuanced understanding of the complexities inherent to multiple worldviews interacting. Ways of knowing are themselves tools for relating, mechanisms by which relating can occur. By expanding their epistemological toolkit not only can student understandings of relationships shift, but the nature of the relationships, and the ways their nature can be known, is also expanded.

***Experiencing and valuing connection with nature in new ways.***

The data contains a multitude of expressions of relating in different or more intimate ways; with nature in general, and particular natural beings as well. Central here is the idea that the way you relate determines what you can experience.

Especially with the wind, because that was the being that chose me. Like today, it's a beautiful day. The wind is blowing, it's warm, so I notice that, whereas before I would have gotten out of my car and rode my bike as fast as I can to class, and not paid attention and enjoyed it and let it calm me down. (MWK RN 1.2)

This student was enabled to receive solace, peace, and comfort from the experience of the wind, and their relationship with the wind has more intimate than mechanistic.

One of the Indigenous participants felt that the real value in the course lay in its ability to confer to non-Indigenous students an understanding of, or the ability to, connect to nature in a more whole sense.

So in that way I would like to say the importance in the course was not in just the giving of information. Giving information is only a key. The way that people are going to use this key, they need to open the door right? To spiritual world, and if the information was given in the right, if they got the right piece, they are going to open the right door. It doesn't matter which class they will take in the future, what kind of jobs they will get in the future, they will be already connected. (MWK RN 2.2)

For this participant the connection to nature, and the spirit world, is the foundation from which appropriate action and true insight can be developed. Their view is that any endeavor the students move on to in the future in relation to sustainability will benefit from their more intimate connection with nature.

In relating to nature in new ways one comes to understand that nature itself has different properties, and you yourself have different capacities for relating. This transrational relationality both produced a sense of groundedness, and creative inspiration for students.

I think I am a lot more aware of the potential that comes from nature, in terms of grounding me, in terms of offering insight and guidance from ... I think I am also a lot more aware of how much more I could be in touch with nature, and how I can actually get in touch with it, and how rarely I do that. I think also when I am outside and having experiences in nature I now interpret those experiences a little bit differently. I think

about them at a different level, in terms of intuitive connections, and energy. (MWK RN 3.1)

Epistemological stretching can make a student more comfortable with relating to nature in an intimate and meaningful way, and give them the tools to do so.

To be present in the world “in a more intuitive, grounded sense” (MWK RN 3.3) is in and of itself a worthwhile goal in the opinion of multiple participants, and grounding meditation was a particularly valuable practice that many took away from the course. “The connection and being able to sit down and think about your natural surroundings in a different way. Without that, my graduate experience would have been much different. I still use that grounding exercise” (RHS 4.1). While a valuable end, it is also a mean to being grounded by the experience of being human-in-relation to nature, and the embodied and intuitive knowing that can result from being open to relating to nature in this way is helpful in a practical sense as well. One student talked about the role of grounding and nature connection in the context of doing research. By engaging with nature not just intellectually, but as a whole person, this student noted that opening to somatic knowing is a tool for “interacting with those natural things on a subconscious plane. By allowing my body to actually have time to do this, where my mind isn’t distracted writing my theses, I’m actually allowed to have a fuller interaction. I am in turn allowed to pull the knowledge that the body has gained through these interactions, I think this is a source for a lot of inspiration that I might receive” (MWK RN 6.1). This quotation provides an example of a student finding value in the application of somatic knowing in the context of their research. For this student, experiencing and valuing connection to nature in new ways has an impact in their personal time, and their academic and professional endeavors.

### *Deconstruction of anthropocentric hierarchy*

For several students a straightforward acknowledgement of non-human beings as animate and alive in a sense that does not privilege humans occurred. Animistic understandings were significant for some students, and in other cases students were less impacted by animistic conceptualizations, but none-the-less, their anthropocentric and hierarchical understanding of humanity as somehow separate from the ecological systems in which we are embedded was diminished or done away with.

A number of students' comments alluded to the idea that they understand natural beings to have the same quality of aliveness as humans, and this change in perspective is associated with their epistemic learning experiences. A number of students' comments alluded to the idea that humans are not the sole perceivers, or the only vessel for consciousness in the Earth system. In one instance, this shift in understanding contributed a great deal to the reconceptualization of a student's relationship to anthropocentric worldview assumptions, as well as to non-human beings themselves. This idea arose when the student was asked about any epiphanies that stretched their concept of what knowing means.

Some of the readings that we did really made me think about how we are so used to being the observers, and so used to being the perceivers, that we forget that we are also being perceived. Which I thought.... That was a huge, something really important to recognize. That even when you're standing in a cluster of trees, you're not just looking at them, and they're not just static objects, they are aware of you as well. And I really believe that, it makes a lot of sense to me. But I never thought of that before, I never consciously had

those thoughts before. I may have had a feeling it was like that but I... and I really use that a lot now, even just the way I'm thinking about wildlife in my research. It's made me really think about how wildlife is looking back at people, and learning from people. (AC 5.4)

This animistic understanding has become an important part of this participant's research into wildlife management, and resulted in a development of their own personal ways of relating to nature. "If I touch a tree or if I touch a rock or something, I think about a lot more.... They are a lot more animate, to borrow from that terminology. Just the idea that it might be feeling me, too, is.... Yeah I think it's really cool, I enjoy that, it's a good way to live in the world, I think" (AC 5.5).

For the students whom relating to nature as animate did not become a regular part of their life, the experience of engaging with it in the course was still viewed as valuable. An example:

I tried really hard to see things from the tree's perspective – an animist point of view. I lay there for a while, studying all the individual characteristics of the tree: the needles, the texture, the colours and shadows... then, I felt like my perception switched, like I could almost see myself lying under the tree, and that each of the needles had eyes, that they were looking down at me, just watching placidly, with no emotion. It was a strange experience. I can't really explain any further than that – I felt intrigued I guess. I haven't really attempted to do this again since I finished the course... it's not really something that I feel is necessary, but at least I tried and succeeded in seeing things differently than the way I know my surroundings. I can better understand what people mean when they

talk about the trees and other living or non-living beings as having spirits and thoughts of their own. (AC 8.1)

In this way, non-anthropocentric and animate worldviews become more accessible, or relatable, for the students that engaged with epistemological stretching.

***Stronger ability to respect knowledges that are not yours***

Epistemological stretching puts students in a stronger position to acknowledge and respect different ways of knowing. For some participants this was particularly important, as their work or research is improved by a stronger capacity to engage with Indigenous knowledge holders in appropriate, non-presumptive ways, and this course was designed to better prepare resource managers and sustainability professionals for this aspect of their work. It is important to

...understand where it comes from. Believe that they are receiving the knowledge that way. Because if you've taken the course you know that you do receive knowledge from whatever your natural being is that you selected for that project. So I have taken that with me, definitely, and I think that because of that I can more easily relate to First Nations and Métis people. I know the questions to ask. (VKSE 1.4)

The experience of engaging in communication with a natural being in the natural history journal project conferred a greater understanding of, and respect for, this more animistic or Indigenous way of relating to nature. Acknowledging representatives of Indigenous knowledge systems on an equal footing as venerated representatives of modern western knowledge was also viewed as appropriate by this student. He/she suggests that "I think it's very comparable the level of training for an elder versus the level of training for someone with a PhD" (VKSE 1.9),



suggesting that both are representative of a deep understanding developed over many years of inquiry, and both deserve equal respect and acknowledgement.

***Relationship between epistemology and “worlding”***

All non-Indigenous students that participated in this research came to a point where they can recognize the fact that most of the dialogue around issues of resource extraction takes place within the epistemic space cordoned off by modern western culture, and without acknowledging Indigenous worldviews (see Lens 4). According to one student, the problem at hand is

...not a matter of ‘ownership’ but rather connectedness. Companies that are degrading the environment are threatening the well-being of the whole system – and the people who live in it – they threaten and therefore disrespect the delicate relationship that ‘keepers of the land’, the first nations people, have. I come from a western epistemological background, and I don’t think I fully understood WHY or HOW some people are so in-tune with their environment, but I knew some people are just ‘that way’ and they happen to be first nations... if that makes sense. Therefore, I have a much deeper appreciation to the dilemma that these aforementioned groups face. (VKSE 8.1)

The same epiphany here was expressed in a different way by the same student when discussing their most important learning experiences in the course. The student suggested that to grasp the meaning and implications of the fact that there are multiple worldviews and ways of knowing and being, that human beings enact, can itself be a powerful learning experience. “I didn’t really get the whole concept that people literally SEE and FEEL the world differently” (BtI 8.1). For this individual the real depth of learning occurred when they realized multiple worldviews meant multiple worlds, and “worlding” (the creation and inhabitation of the world

you live in) is enacted from a perspective with its own understandings and assumptions. These data points express a deepened understanding of and respect for the multitude of extant worldviews, and also express a greater willingness and ability to engage with them in a way that does not subordinate non-western worldviews. “I now see their beliefs as their worldview and their reality, not just their religion, if that makes sense” (EIK 3.6).

### **Lens 3: Change in Perspective and Actions**

The students (except 1) report a change in their perspective and/or actions as a result of participating in the course. These changes occur in the areas of valid epistemic practices for self or others with a stronger affinity for affective and intuitive knowing, deepened understandings of the epistemological landscape of students’ fields of practice, a reflexive approach to their own worldview and knowledge claims, and ethical understandings around knowledge integration and self-location.

A shift in the perspective of the individual is important to note here because it is central to the transformative sustainability learning experience. The learning must result not just in new understandings, but a new perspective from which further understandings can develop. We see in the data large transitions towards relating to nature in more intuitive and spiritual ways. Epistemological stretching gives students the tools, and permission, to explore new ways of relating to nature. The student’s experience of more intimately relating to nature, combined with the epistemological stretching most students need to undergo to relate in this more intimate way, is the crux of the change in perspective and action epistemological stretching can facilitate.

There are very obvious connections here between the reconceptualization of relationships, and this lens, but this lens is distinct. Reconceptualization of relationships means a development in the student's frame of reference. This lens refers specifically to the enactment of those reconceived relationships.

***Students able to feel, as well as think, their way through work/school/environmental problems***

Within this course, and among the students involved, epistemological stretching takes people from an intellectual space in which they are comfortable, towards an affective space that they become comfortable in; it is a move from just thinking to thinking and feeling. All students, except two, report an increased inclination to feel, as well as think, their way through personal, professional, and academic work (e.g. CBE 1.1, CBE 5.1), with the exceptions reporting that they brought this capacity with them to the course and it went largely unchanged. This change indicates the experience of epistemological stretching served to validate the affective and intuitive aspects of themselves, provide protocols and practices for application, and conferred a great deal of perceived value in their application. As Master's students in the School of Environment and Sustainability (two participants were from related Colleges, with overlapping subject area), the purpose of the students' academic and professional work is to move towards sustainability in whatever way they conceive of it. For the students in the, course their intuitive and affective capacities have become (or were already) important tools in this work. Additionally, a worldview that understands there to be the possibility of intuitive connection with nature is viewed as an important element in finding sustainable ways to be human. A central

element of this is the feeling of connection. The feelings of connection with natural beings, and of connection with people representing worldviews other than that of modern western culture, were both to a large extent enabled and validated by the experience of epistemological stretching. This connection was primarily affective in nature, and came through intuitive, emotional, or spiritual processes as well as rational ones.

One student expressed this ability to feel as resulting in decentralizing the self in the knowledge generating process. Rather than take responsibility for the creation of knowledge, the process itself has been reconceptualized, and knowledge can be viewed as something that is received, something that is let in. When talking about personal knowledge practices and shifts therein, it was described as “not thinking, just receiving, maybe is a good word. Yeah, knowing just it’s always been knowing was an action. And now knowing is just letting something in (CBE 1.10).”

There is a consistency to the expressions made by students in this area which include a changed awareness in and of nature (CBE 3.3), an animated interpretation of interactions with nature (CBE 1.7), and an altered interpretation of the interactions with natural beings that occur (CBE 3.5). The distinction between these second and third points in my view is that students are conceptualizing *what* they are interacting with to be a different thing, as well as receiving the experience of those interactions in a *different way*, using the felt sense.

Even an ambiguous expression of change in terms of relating to nature, proclivity for the affective, or understanding the natural world to possess different properties, is very interesting because for the students these ideas are very much interconnected. It is unclear whether the ability to feel differently led to these new understandings, or the new understandings led to the

ability to feel differently. In any case, the ability to know nature with affective capacities, which are inherently non-mechanistic and non-reductionist, is viewed as a valuable tool.

One student particularly utilized the felt sense of “bodily inklings” to “write a more complex and synthesized thesis” (CBE 6.3) by inviting somatic knowing into his writing process. For this student engagement with somatic knowing was not initiated by the course, rather it was further developed as a tool of creative and academic expression, and understood to be one facet of a sustainable way of being human.

### *Epistemological understanding contextualized in students fields of practice*

The points of learning experienced by the students were easily contextualized in their area of practice, and directly applicable. A student who took the course specifically to learn more about Indigenous ways of knowing appreciated its applicability.

It brought a lot of focus, and new information, and placed it in, kind of in a regulatory framework. An academic regulatory framework maybe. How can we actually do something with this information, instead of, oh this is really great to know and look how interesting it is. (AME 1.1)

A more nuanced ethical understanding about what it means to incorporate traditional knowledge in research changed the stance of one student who chose to “now include local ecological knowledge, which I distinctly refer to as more of an individual thing, versus traditional knowledge, which is more of a cultural, worldview.” (AME 3.2) Another student recognized that some aspects of the local knowledge around wildlife management in the area of her research have noetic qualities.

The term good and bad [animal] is used quite frequently, and it made me realize that people who are really good with [animals], who've spent a lot of time working with them, those people can read them. And I think they read them intuitively. (AME 5.1)

This understanding, that there is intuitive communication received by long term wildlife managers, was there prior to the course, but was validated and encouraged by the course content, and forms the basis for an important aspect of their research.

Multiple ways of knowing are understood by several students to be central to the identification and process of addressing environmental problems;

if environmental problems are perceived to be environmental problems because they're problems to humans, then your worldview determines what the environmental problems are. Multiple ways of knowing is the essence of environmental problems. (AME 4.1)

For this student issues of epistemology have taken a central role in the understanding and articulation of the nature of complex environmental problems, whereas this was not the case prior to the course for this individual.

***Students develop a reflexive approach to worldview and knowledge claims, and are able to self-locate***

Multiple students expressed the sentiment that not only did they learn about the subject matter of the course, but that they learned about themselves through the course. The idea that their understanding of diversity went to a deeper level to include the epistemic and ontic realms of human multiplicity, seems to be closely related to the process of self-location and reflection on their own epistemic and ontic perspectives and assumptions. The combination of this self-location with a course process based on cultivating the capacity to engage multiple ways of

knowing also resulted in shifts in the students' own personal knowledge practices. "Going into it I thought I was fairly open-minded, and fairly open to new ideas, and that I kind of knew about all of these other things, and I was just completely wrong" (SRe 1.1). This response was prompted by discussion of what multiple ways of knowing meant to the participant prior to the course. This same student, who expressed an evolution in what it means to them to be open-minded, also experienced a large shift in her understanding of what knowing is. She articulated that each of us have our understandings of knowing as a process that occurs in certain ways, and for her "it's always been knowing was an action. And now knowing is just letting something in" (SRe 1.6). Here we see that epistemological stretching can take place inwardly and outwardly. Outwardly, towards others and their diverse ways of knowing, and inwardly towards ways of knowing which resonate with the self, but perhaps weren't previously acknowledged.

Another student chose to express an evolved self-location in relation to nature by saying "we are so used to being the observers, and so used to being the perceivers, that we forget that we are also being perceived" (SRe 5.3). This self-location, within a conscious, animate natural system is one that I argue breaks from the norm within the paradigm of modernity. It is as if once students realized there were other extant ways of knowing and being, they realized that they can choose which epistemological discourses to embody.

This combination of self-location and engagement with the multiple ways of knowing leading to radical personal shifts did not always occur. One student expressed the sentiment that one feels good;

if one stays in the moment and lets go of some of the mental clutter. Whenever I feel stressed, I talk to the trees, bushes, etc. I let my stress melt away, because each of the

beings can absorb and refresh it. (SRe 8.3)

However this same student acknowledges “I am still rooted in western epistemology. This would be a very difficult thing to change, but I am open to other epistemologies, and appreciate them” (SRe 8.4). This indicates that this student perceives there to be space within her western epistemology for an intuitive nature connection to arise, while remaining rooted within her original epistemological understandings and worldview.

***Increased capacity to navigate the complex ethical landscape in effective and ethical ways***

This area of learning is characterized by a sense that the *depth* and *nuance* of the understanding all non-Indigenous students in this study possess of the ethical issues inherent to knowledge appropriation and integration, has grown significantly. Each non-Indigenous participant expressed the sentiment that the course better prepared them to engage with those who hold non-western worldviews, and one of the Indigenous students expressed this also. For one student the course conferred an understanding that “in animism, animals and other beings are people. And it’s not a symbolic relationship; it’s a relationship of equals.” (IE 3.1). This student felt that this particular understanding was key in terms of appreciating and understanding people coming from an Indigenous worldview. In the context of resource co-management, if the fundamental relationships that make up the system to be managed are conceived of differently, then the process of knowledge “integration” is further obfuscated by the de-contextualization of that knowledge from its worldview.



Students also acknowledge the inherent difficulty of saying they are better prepared to engage with Indigenous knowledge holders. One student expressed this hesitation by saying “one issue I have with this class is that you get into weird appropriation issues, so how do I say that I understand where their coming from without saying, oh yeah, I’m totally aboriginal now, I’m just like you” (IE 3.5). I would contend even an acknowledgement of this sort signifies that this student is conscientious enough of the differences in worldviews and able to self-locate effectively enough to handle engagement with an Indigenous knowledge holder with a higher level of consideration. As another student said, “when you work with aboriginal people you don’t know the answers, you have to know the questions” (IPC 1.2). This individual was expressing the problem within their field of individuals, consciously or subconsciously, placing Indigenous knowledge underneath modern western knowledge in a hierarchy of power. If that is the case, then it follows that consultation with an Indigenous knowledge holder presumes a relative lack of value in their knowledge. For this individual, the strengthened ability to relate to aspects of an Indigenous worldview that resulted from epistemological stretching allowed them to be more appropriately inquisitive, ultimately resulting in a sense they can better perform their work.

Students found themselves in the troublesome space of attempting to bridge different worlds. “What I did, and still do struggle with, is how all those things can exist, but I live in this world, and I don’t know what that means. I don’t know where to draw the line between what is possible and what is not possible, and is there a line, and what is my perception, what is intuition” (RHS 3.2).

It is in this nebulous space that the treacherous ethical landscape around knowledge appropriation, integration and bridging is expressed. Into what, are non-western knowledges integrated? How does that integration further sub-ordinate non-western knowledges, and further strengthen colonial power dynamics? Is ‘integration’ even appropriate? How does one come to understand these issues, yet not engage in “appropriation” issues? These are ethical aspects of knowledge integration with which all non-Indigenous students expressed some deepened ability to engage. Students acknowledge a sense of being better prepared to respect Indigenous worldviews, but also acknowledge the difficulty in trying to understand and empathize between worldviews,

During our interview one student had an epiphany relating to co-management and knowledge integration. When discussing any perceived issues around the idea of knowledge integration the succinct understanding that “co-management is not about incorporating that knowledge in to environmental management as we know it, it’s more about making decisions together” (IE 4.4) came to the surface. This participant’s research takes them to Indigenous communities, and sought their views on wildlife management practices. Upon reflecting on the field experiences and the course itself, a very distilled articulation of resource co-management was expressed. Making decisions together “As opposed to integrated, that is what co-management is” (IE 4.5). Integration was viewed by this individual as laden with power issues, not fully acknowledging the validity of the local and traditional ways, and undesirable when, ostensibly, there could be a better framework for bridging across worldviews for effective resource management.

Overall, the experience of epistemological stretching is demonstrating itself valuable for all students who work in partnership with Indigenous knowledge holders, and a central theme is respect. “I was working with First Nation’s people, so I feel like I had a different way of interacting because I was trying to be respectful of their knowledge system.” (IPC 6.1). The students feel they are now in a stronger position to respect Indigenous knowledge by developing an awareness of these nuanced ethical issues.

#### **Lens 4: Worldview Bridging**

This lens is characterized by two main ideas. First, epistemological stretching provides a valuable learning experience for those who must engage in some degree of worldview bridging for their work or research. This is particularly relevant to participants involved in natural resource management and environmental consultation who, in the course of their work, interact with Indigenous knowledge holders and supports both an increased understanding of the validity of Indigenous knowledges, as well as a stronger capacity for cooperation and communication. Additionally, there is the idea that epistemological stretching can be the bridge that connects one to a transformed worldview for themselves. This worldview bridging is the perspective transformation central to the transformative sustainability learning experience. For students coming to the course without much or any exposure to multiple ways of knowing, epistemological stretching resulted in an understanding of the diverse peoples of the world as a constellation of worldviews, rather than a collection of cultures. In this way the students were

able to deconstruct the hierarchical relationship modernity places itself in with relation to other worldviews.

***The importance of seeing and believing Indigenous knowledge is real, valid***

According to one student, to adequately do the work of worldview bridging in environmental consultation requires you to “see and believe that what these elders are seeing is real, [if you can’t] then you’re not going to be able to efficiently relay the information to someone else” (EIK 1.1). A deeper respect for Indigenous knowledge traditions resulted from this student’s exposure to the University’s Elder-in-residence, and from their engagement with a natural being in the natural history journal project. In particular one student developed great respect for the status of Elders, and this has impacted how she approaches her consultation work. “A lot of the time any dealings you have with the chief and council, they would have dealt with the elders before meeting with you or after meeting with you, but a lot of the questions that need to be answered need to come directly from an elder. I think it’s encouraged me to go past the structured government, and searching out people that might actually know more” (DI 1.5). This participant expresses the sentiment that there must be parity between knowledge systems in the understanding of the person conducting this work in order to do it in a considerate and appropriate way. Every non-Indigenous participant expressed a greater respect and appreciation for knowledge system diversity, and a sense of being better prepared to work in an environment where multiple knowledge systems are represented. Epistemological stretching as conducted in the class resulted in many students identifying their own epistemological positions, as well as providing experiences which helped expand their epistemological repertoire.

***Develops a stronger capacity for cooperation and communication***

The problem for individuals trained in the western academic tradition when engaging with Indigenous knowledge is that Indigenous knowledge is contextualized in place, expressed in an embodied way, and is impossible to contextualize in strictly rational and mechanistic epistemological frameworks. “I was aware that different ways of knowing existed going in to the course, but I think those times where everyone shared their feelings, in the course, actually was quite helpful for my ability to interact with people with different ways of knowing. That’s one thing I think the course really contributed to my graduate learning, was my ability to interact with people who have a different way of viewing the world, and I think that helped me in my field work. Just sitting back and listening” (IPC 4.1). The ability to simply listen and attempt to absorb, rather than dismiss outright, understandings that don’t fit within your epistemic framework is in and of itself valuable to any sustainability professional attempting to engage in worldview bridging for their work or research. In this sense there is applied value for these epistemic learning experiences, and the “value lies in when you’re actually conducting your research, and how you’re interacting with those sources that you have. How you’re treating different knowledge systems that you might run up against. For me, I was working with First Nation’s people, so I feel like I had a different way of interacting because I was trying to be respectful of their knowledge system” (IPC 6.1).

***Multiple ways of knowing allow students to re-articulate the nature of the system***

Sustainability as a field values holistic approaches to address complex socio-ecological problems. Saying that is one thing, but it begs the question, how are you conceiving of the whole? “What is the system, how are we defining the system? And once we define it like that, how do we actually think about it?” (RHS 6.4). Is spirit a part of the system? Does the system have properties which enable humans to engage in transrational ways of knowing? One’s answer to these questions greatly influences how you would conceive of the socio-ecological system in question. Those questions would be answered differently by people who hold different worldviews. An epistemologically plural approach gives students more tools to understand the system and its properties, and for some the experience of epistemological stretching itself changes their understanding of the system’s properties. In one case the incongruence and incompatibility of multiple knowledges when “integration” is the aim characterizes the nature of sustainability problems as a whole. “If you take the approach that environmental problems are perceived to be environmental problems because they’re problems to humans, then your worldview determines what the environmental problems are. Multiple ways of knowing is the essence of environmental problems” (RHS 4.2). In other words, properties of the ‘whole system’, as you understand them determine how you articulate the nature of the problem. If the whole system, as you view it, is conceived of in an anthropocentric way, for example, then your solutions to environmental problems will reflect that understanding. A perspective that does not associate itself with anthropocentric assumptions might view the problem and consider that “people are not being managed, wildlife is being managed, but the problem is people need to be managed” (RHS 5.4). In this way, the experience of epistemological stretching helped facilitate a

transition from an anthropocentric worldview to a worldview in which nature can be treated as alive, and animate.

### **Lens 5: Validation of Previously Held Views**

While the other thematic areas are broken down into sub themes which express different ways of thinking about and interpreting that conceptual space based on the data, this one is not. Neither is it the loudest theme in the data, but it is present, and relevant, for both Indigenous and non-Indigenous students. The idea here is that engaging in an epistemologically plural academic space was a validating experience for students, in different ways depending on what they brought to the course.

For a student engaged in issues of wildlife management, the presentation of sustainability questions from non-western, non-anthropocentric, and Indigenous perspectives was a welcome perspective. “I never felt like science was the answer to everything, and I didn’t feel like we could figure out all the world’s problems by looking at them in a very rational sort of way. I’ve had a lot of experiences in my life which I don’t think fit, and can’t be rationalized. I think that was part of the draw to the class” (VPHB 5.1). By providing a space in which other-than-rational epistemologies could be applied to sustainability issues, the inclinations this student held previous to entering the class could be explored openly. This validation was primary to this student’s positive experience in the course. “I think that’s the number one thing the course did for me. It created a really safe space for that, and it also gave some sort of validity to these ideas of intuition, or knowing through your body, or communicating with plants and animals” (PES 5.2).

Another student came to the course with the experience of considerable personal development in their own understandings of relating to nature, much of which occurred doing socio-ecological field work. “I was always really influenced by the natural world, and taking information from it, and so being in this class after my time abroad, I was really open to the ideas of taking information from the natural world, even if I’m not processing it in my mind” (VPHB 6.1). For this student embodied knowing is an important self-practice, and this was the case before taking ENVS 811 with its teaching orientation towards epistemological stretching. This individual’s connection to nature is something they go to in order to find inspiration, creativity, and solace by attempting to be fully present in moments of quiet reflection. This student did not feel like the course exposed them to anything new. “I was exposed to a lot of the ideas prior to, in this other class that I had taken, but this class reinforced those ideas, and I was seeing it from another person’s, another professor’s perspective. I wasn’t familiar with the authors she had on her reading list, so I was getting to see those kinds of ideas that I had been exposed to prior, from the perspective of more authors. I guess the class had further validated some of those feelings, as well as reinforced those things within me, and to be cognizant of them as they arise” (VPHB 6.2). In this way the environment in and content of the course was conducive to the further development of an embodied knowing practice and an intuitive nature connection.

For another student, who self-identifies as Indigenous, the natural history journal project, and the associated imperative of attempting to communicate with a natural being, referenced their roots, but also expanded on the implications. “Writing the journal, talking with my living being, which in this case was a tree. You know, it’s something that I used in my country, or in my city with my grandma and my mom. Talks with plants, it’s usual. But not in the sense that you go



in depth, and try to understand, or try to listen to what the tree is telling you. Maybe not in that way. But I think that experience, to write in the journal, was a good one” (VPHB 7.1).

Related to, but slightly divergent from this idea of validation is the fact that without an environment supportive and permissive of transrational ways of knowing, it isn't always easy for students to maintain their engagement with these ways of knowing. For one student, having access to a validating and supportive space for, and a process in which to engage with, transrational ways of knowing resulted in a positive learning experience, but that engagement became more difficult after the course was over. “I also did in the class have a lot of experiences of being able to feel energy, and do plant communication and things like that, but it's been really hard to keep up without the course. I found that without that framework, encouraging and supporting that type of activity, I have had a really hard time maintaining that, and a hard time believing that it is a part of my reality” (TE 3.3).

#### **Cycle 4: Synthesis**

To bring Cycle 4 to a close, I will reflect briefly on my process of developing these 5 lenses.

I did not look at the Cycle 2 lenses during the data collection and analysis phase, a period of several months, in accordance with intuitive inquiry. As a result, when I revisited them they seemed removed from what the research had become, and reflected my own perspective, informed by literature and my past experience. Their structure had little association with the way the data spoke to the experience of epistemological stretching, and they struck me as simply statements of opinion mixed with theoretical understanding, the most sophisticated statements a

neophyte graduate student researcher could generate after engaging with the literature and being involved in related research projects. Methodologically speaking, that is exactly what they are supposed to be.

They are meant to change. While those theoretical statements and understandings are not empty of value, the 5-lens structure much more accurately describes the areas the data illuminates. Since I began working with this lens structure I stopped thinking of them as lenses, or understandings, and considered them to be areas where ‘stuff happens’ for students; conceptual spaces within which the experience of epistemological stretching can be talked about and understood. That is what the Cycle 2 lenses were missing: the experience. In Cycle 2, the lenses reflected the experience of myself, and views from the literature I had consulted. On my own life path most of the epistemological stretching I have undergone did not occur in the context of sustainability education. The data demonstrates there is fertile space within transformative sustainability education for a teaching orientation towards epistemological stretching. It can help facilitate the perspective transformation that is primary to that pedagogical approach.

The data suggests that a pedagogy that includes a reflexive approach to students’ epistemological assumptions and worldview, combined with learning experiences that acknowledge and deconstruct power dynamics which marginalize Indigeneity, multiple ways of knowing, and animistic worldviews, can facilitate the development of the frame of reference inherent to transformative learning experience as we define it.

## **CHAPTER 6: CYCLE 5 CONCLUSION AND SYNTHESIS**

The purpose of Cycle 5 is the presentation of the theoretical implications of the research. Here the researcher determines what is valuable about the study, what is not, and presents an honest account of the shortcomings of the research. In addition to this, the researcher is obliged to “speculate about the possibilities implicit in the data that draw us closer to understanding the deeper and more restorative and transformative elements of human experience” (Anderson & Braud, 2011, p.59). Cycle 5 is an opportunity to reflect on the research itself as a process, “including (a) mistakes made, (b) procedures and plans that did not work, (c) the researcher’s apprehensions and puzzlements about the study and findings, (d) the style of intuitive interpretation used, and (e) what remains unresolved or problematic about the topic or method” (Anderson & Braud, 2011, p. 59). Cycle 5 is the opportunity for me to say anything left unsaid about the phenomenon of epistemological stretching as it relates to transformative sustainability learning, discuss the implications and possibilities revealed in this area of inquiry and describe my vision of the relationship between epistemological stretching and transformative sustainability learning.

### **Problematic aspects of the method**

Intuitive inquiry is well suited for research into transformative learning experiences, as it facilitates deep intersubjective engagement, exploring transformation in the self and others. It is also epistemologically congruent with inquiry into spaces where multiple ways of knowing are

valued and utilized. The most problematic aspect of the topic and method for this research is its communicability. In the writing of this thesis I have wrestled with the imposition of discourses about what a thesis is, and how it is constructed. In an intuitive inquiry the reading of the thesis is itself an intersubjective experience. As such, I have tried to maintain a narrative quality to tell the story of the growth in understanding that resulted from the research process, and use a personalized voice while telling it.

In earlier sections I have explained my worldview, and what I aspire to as a human being, but my fear is that those explanations make the most sense to individuals who have practiced Zen or Japanese budo, and leaves those who haven't with many unanswered questions. Initially my approach to intuitive inquiry was very academic; I had not taken ownership of the process, it belonged to academia and was not yet my own. Over time my application of the methodology became more ritualized, more ceremonial, and it became imbued with the qualities of my meditative and martial training. My understanding of intuition associates it closely with a spiritual relationality. For me, the ability to intuit is heightened as one moves towards spiritual unity. Towards that end, this intuitive inquiry had to align itself with my spiritual way, my transformative process, and it took time and work for me to negotiate how to do that.

Upon reflection I would standardize my process more if I were to conduct another intuitive inquiry. A teaching that was passed on to me is that your life is your training, and your training is your life. If you train in martial arts for one hour of the day, and it does not touch your thoughts at other times, then it is not your way; it is simply something you do sometimes. My meditation practice emphasizes the same quality. If peace and tranquility is accessible only when you sit in a quiet space with a comfortable relaxed posture then your practice is not carrying over.

You must bring that peace, tranquility, and presence of being with you as you move through the world, in whatever spaces and postures you find yourself. I strove to consciously embody the transformative learning experience, and the methodological approach, even while not “working on my thesis”.

I thrive in spontaneous states of being, and the great freedom within the structure of the 5 Cycles accommodated my integration of the research process in a rigorous, but openly constructed way. This suited my inclinations, my philosophical orientation, and my personal approach to my own intuitive practices. However I think the methodological process can benefit from a more rigid, consistent approach. In the future, if I were to conduct another intuitive inquiry, I would set aside time each morning to specifically engage in the intuitive inquiry process, rather than engaging in it at my discretion. I think this would give a more steady, continuous quality to the process, and the inquirer would rely less on breakthrough moments of big progress, and more on stable, consistent rates of advancement.

### **Problematic aspects of the topic**

The most problematic aspect of conducting research on epistemological stretching and transformative sustainability learning also relates to communicability. To acquire qualitative data about these phenomena requires the researcher to create a dynamic in which participants are comfortable and able to express themselves with regards to shifts in their epistemological and ontological perspective. The researcher must ask participants to express what it means to them and how it feels to be human-in-relation, and how that meaning might have developed as a result of particular learning experiences. There is a certain ineffable quality to this feeling that can make it difficult to express in anything other than a nebulous way. An example: “we went for a

walk around, and it felt like, oh, I could do this experience this way, or I could do it this way. Right now, I am doing it this way, in a more intuitive, grounded sense. Does that make sense? It was the same activity, but I was doing it slightly differently” (ErL 3.3). This participant and several others expressed the idea that epistemological stretching helped them access new ways of being human-in-relation. I am sure that over time if my skill as a researcher grows, then my ability to create an interview dynamic in which shifts in epistemology and ontology can be expressed fully and with great nuance, can evolve. However I do not anticipate a point where the expressions of a participant can contain as much meaning for me in data analysis as they do for the participant in an experiential, embodied sense. While that statement may very well be true for all qualitative research, it is particularly poignant when the subject matter is epistemological and ontological shifts.

### **Head, Hands and Heart and Epistemological Stretching**

Head, hands and heart is a demonstrated pedagogical strategy for facilitating a transformative learning experience (Sipos, Battisti, Grimm, 2008). Epistemological stretching is another strategy seeking to facilitate the same kind of experience, but with a slightly different orientation and perspective. However in a very practical sense epistemological stretching also asks students to engage their cognitive, psycho-motor, and affective domains. Students were exposed to diverse perspectives on multiple ways of knowing, engaging intellectually through course readings and discussions. The natural history journal project engaged both the psycho-motor and affective domains, giving the students an opportunity to enact their theoretical learning, and translate new principles and values into action. Students were tasked with developing the hands-on skill of relating to nature in somatic and intuitive ways, engaging both

domains. In that regard this research suggests that a teaching approach which engages the three domains is effective in education for transformative sustainability learning experience. That pedagogical approach, as defined in the literature (Sipos, Battisti, Grimm, 2008) was not explicitly in place, and was not used as a framework to assess the learning experiences of students in this research. However it was applied in a modified way within the orientation towards epistemological stretching.

A significant difference is present in the emphasis epistemological stretching places on critical reflection on the epistemological assumptions of the self, one's field of practice, and developing the understanding that our worldview shapes our reality. Sterling (2010) sketches the conceptual ground of transformative sustainability learning, referencing Bateson's concept of epistemic learning, saying that "learning within paradigm does not change the paradigm, whereas learning that facilitates a fundamental recognition of paradigm and enables paradigmatic reconstruction is by definition transformative" (p. 23). Epistemological stretching facilitates recognition and reconstruction of the epistemic paradigm of the students, and their understandings of the epistemic paradigm and possible paradigms in their fields of practice. This makes epistemological stretching a valuable and complementary pedagogical approach to one that emphasizes student engagement with cognitive, psycho-motor, and affective learning domains, and one that can further facilitate transformative sustainability learning experiences.

### **Transformative Sustainability Learning**

Epistemological stretching helps the students to enter and inhabit a more liberated epistemological and ontological space. It can also help the students to "reconceptualize not just sustainability but the processes used to produce sustainability knowledge" (Miller et al., 2011, p.

189). It is a step towards educating sustainability professionals that have the “competence to integrate, connect, confront, and reconcile multiple ways of looking at the world” (Wals, 2010, p. 388). It is also a step towards educating sustainability professionals that can engage in “knowledge co-production, which we define as the collaborative process of bringing a plurality of knowledge sources and types together to address a defined problem and build an integrated or systems-oriented understanding of that problem” (Armitage, Berkes, Dale, Kocko-Schellenberg, & Patton, 2011, p. 996). Furthermore, it works towards “extending the epistemological and ontological bases through which socio-ecological problems are approached” (Barrett, 2013, p.190), potentially resulting in problem definitions that are more inclusive of a plurality of epistemologies and ontologies.

My sense is that sustainability as an academic field needs to develop the capacity to train a new kind of professional to demonstrate that significant strides have been made “toward systemic, connective and ecological ways of learning” (Burns, 2011, p. 2). I wonder whether the emphasis on sustainability knowledge creation overlooks the point of Wendell Berry: that instrumental knowledge is not as valuable to human beings who seek to live with Earth as wisdom is, a sense of propriety with regard to how knowledge is to be applied. Sustainability education has demonstrated that it can develop scientists of the natural and social variety, and interdisciplinary scholars. I am wondering if that capacity alone is sufficient. There is a chance that sustainability education, in order to engage successfully with a viable sustainability trajectory, must also be able to develop sustainability professions with the qualities of shaman, medicine people, animal communicators, pathfinders, healers of socio-ecological trauma, or at the very least, sustainability professionals who can connect with the aforementioned in effective



and ethically appropriate ways. If the concept of epistemological pluralism utilized by interdisciplinary and sustainability fields of practice is only welcoming to established academic epistemologies then it is pluralistic only superficially, within a circumscribed space, and does not fully acknowledge that the University and its process of education “itself is part of the dynamics of the system that it seeks to change” (Miller et al., 2010, p. 178).

### **Individual and Social Transformation**

Transformative learning theory focuses on perspective transformation. However, its contribution to sustainability pedagogy is valuable only to the extent to which this transformation can contribute to the dismantling and reconfiguration of the material arrangements and ideas responsible for unsustainability. This thesis focuses on individual transformative learning experiences, rather than transforming material arrangements. Transformative sustainability learning is a meant to move individuals towards a more coherent sustainability paradigm, as well as result in the students being more ably prepared to work towards the social and organizational transformation sustainability requires of us. The role of transformative sustainability pedagogies is to position individuals to engage in that social transformation with a stronger capacity to identify and create the material conditions conducive to social and ecological justice.

Transformative sustainability pedagogies exist as a result of an ongoing social transformation process. “Transformative social learning – albeit reactive – whether precipitated by energy price shocks, health scares, terrorism, or global warming for example, is already with us, shaking public assumptions” (Sterling, 2010 p. 30). This relationship between individual and social transformation is a complicated set of feedback loops; in depth analysis of this relationship is beyond the scope of this thesis but worthy of consideration. The unfolding social and

environmental landscape of the future will continue to cause transformative social learning.

Sustainability programming needs to “develop student capacity to both respect and engage ways of knowing which are inclusive of, but also extend beyond, Western forms of rationality” (Barrett & Wuetherick, 2012, p.13) in order to avoid reproducing unsustainable epistemological discourses, and create an epistemologically resilient sustainability paradigm.

### **Value of this Research**

The value of this research is ultimately something for you, the reader, to determine. This research makes a contribution to the theoretical space of transformative sustainability learning, a space in which there is ample room for more voices and perspectives. It demonstrates unequivocally that epistemological stretching helped the students interviewed feel better prepared to engage effectively and ethically with Indigenous knowledge holders. It shows very clearly that the epistemic learning experiences resulted in varying developments of the student’s frame of reference, reconceived relationships to epistemologies and non-human beings, access to other ways of knowing and being, acknowledgement and confrontation of discourses which reproduce epistemic power, and more conscientious presence in spaces where multiple worldviews encounter one another. It demonstrates that epistemological stretching is a valuable addition to the pedagogical repertoire of transformative sustainability learning.

To conclude, I revisit briefly, the five lenses of Cycle 4 and consider how they lend insight to the research questions of this thesis. The guiding questions were:

1. In what ways can a focus on epistemology help enable perspective transformation implicit in a transformative learning experience?

2. In what ways can educating for epistemological stretching result in new ways of thinking, valuing, doing?
3. In what ways can epistemological stretching help students engage in more effective and ethically appropriate ways with Indigenous peoples and their knowledges?

Once again, the final five lenses were:

1. Reconceptualization of relationships
2. Change in perspective and actions
3. Acknowledgement and deconstruction of power
4. Worldview bridging
5. Validation of previously held view

Each of the lenses is relevant to each of the research questions. When considering the question of how epistemological stretching can facilitate the perspective transformation inherent in a transformative learning experience, the statements of the participants indicate that this transformation is both inward and outward looking. An ability to self-locate epistemologically, identify discourses that encourage them to privilege particular knowledge systems, and reconsideration of epistemological assumptions are inward looking aspects of this transformation. Looking outward, the participants are better able to identify how epistemological discourses are reproduced, engage with diversity on the level of epistemology and ontology, acknowledge and more respectfully engage across worldviews, and develop the understanding that how one comes to know can determine what can be known. This perspective transformation broadens epistemological horizons, giving students new tools to come to know.

The interviews also demonstrate that epistemological stretching can contribute to a rearticulation of epistemological standpoints as the students expand their epistemic toolkit. For many participants this also resulted in a shift in values, and helped open new ways of relating to nature, identifying and relating to discourse, and an expanded epistemological repertoire for engaging in these relationships.

Epistemological stretching as a teaching orientation has demonstrated value for preparing students to engage effectively and ethically appropriate ways with Indigenous knowledge holders. The course was also a heartening experience for the Indigenous participants in this study, demonstrating to them that there are pedagogical approaches which can bring students from a western background to a place of greater understanding of some properties of Indigenous ways of knowing. The central point here is that epistemological stretching better prepares students to collaborate across worldviews.

The lenses describe the spaces in which learning occurs, and the ways students make sense of their learning experiences. These lenses are the specific qualities of the perspective transformation, the new ways of thinking and valuing, and the tools that help students engage more ethically and effectively with Indigenous knowledge holders.

I sincerely hope this thesis has communicated the value of epistemological stretching as a teaching approach for the field of sustainability. A broadening of epistemological horizons is necessary for the construction of a viable sustainability paradigm.

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